# Birchwood Airport Master Plan Alternatives Development & Evaluation Office Study 2

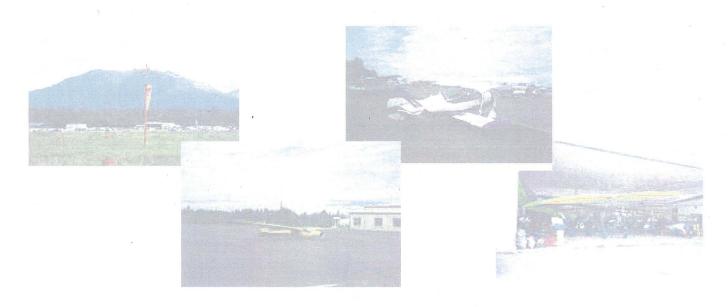
Draft

Prepared for:

Alaska Department of Transportation & Public Facilities

Project No. 54741

Prepared by: HDR Alaska, Inc. 2525 C Street, Suite 305 Anchorage, AK 99503



# Birchwood Airport Master Plan Alternatives Development and Evaluation

Office Study Technical Memorandum #2

**AKSAS Project No. 54741** 

Draft



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Alaska Department of Transportation and Public Facilities
Central Region

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**July 2003** 

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Appendix A: Cost Estimates

Appendix B: Railroad Engineering Evaluation

#### 1.0 Introduction

This report presents preliminary airport improvement alternatives for airport development at Birchwood Airport. The airport development alternatives show runway, taxiway, apron, lease lot, and access improvements needed to satisfy federal standards and state policies, reconcile problems, meet identified airport needs, and satisfy the forecast aviation demand for the 20-year planning period.

Section 2.0 summarizes the problems and needs identified in Chapters One through Four of the Condition and Needs Assessment Report (DOT&PF 2002). These problems and needs were based on DOT's assessment of the airport conditions and comments received through the public involvement process. The alternatives presented in this report attempt to resolve the identified problems and issues.

**Section 3.0** presents a "Demand-Capacity" analysis of the airports' runway and taxiway facilities. Aircraft parking capacity is evaluated in Section 4.0. Based on the forecast of future aviation activity, the analysis in this section examines the annual and peak demands for runway access compared with the theoretical capacity of the runway and taxiway system currently in place at Birchwood. Unacceptable delays, as defined by the Federal Aviation Administration (FAA), are not anticipated. If unacceptable delays had been anticipated based on the analysis, capacity improvements would have been recommended.

**Section 4.0** presents state and federal design standards required for safe and efficient airport operation and identifies elements of the airport that do not meet these minimum standards. Each of the alternatives proposed in Section 5.0 are designed to meet these standards and bring all airport facilities up to the identified standards.

**Section 5.0** presents airport development alternatives. The three alternatives presented are designed to rectify problems and needs, bring the airport up to standard, and satisfy forecast demand for lease space and aircraft parking.

**Section 6.0** presents an initial environmental analysis of the alternatives and compares the advantages and disadvantages of the alternatives under consideration.

# 2.0 Conditions and Needs Assessment Summary

This chapter presents a summary of the findings regarding conditions and needs at the Birchwood Airport. For more information on any element summarized in this chapter, the reader should consult the Condition and Needs Assessment Report for the Birchwood Airport (DOT&PF 2002). These problems and needs were based on an assessment of the airport conditions and comments received through the public involvement process. The alternatives posed in this report attempt to resolve the identified problems and issues.

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage along Knik Arm. The airport serves a regional role for Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA communities. The airport has two runways. Runway 01L/19R is a paved runway that serves GA aircraft. It is 4,010 feet long and 100 feet wide, with taxiways on each side. Runway 01R/19L is 2,200 feet long (600 feet of pavement and 1,600 feet of gravel) and 50 feet wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultra light vehicles. Simultaneous operations on these parallel runways are not allowed. There are approximately 435-based aircraft at the airport. Approximately 85,000 aircraft operations are performed annually.

The airport is in a growing region of the Municipality of Anchorage. Birchwood has consistently made up about 8.5 percent of the Anchorage area's population over the last few years. Anchorage's population (260,283 in 2001) has increased a total of 15 percent since 1990, and the population of Eagle River (29,896 in 2001) and the surrounding area has increased 18 percent in the same time period. Since 1980 however, the population of the Eagle River area has more than doubled—it increased 133 percent from 1980 to 2000.

#### 2.1 Identified Issues

During the first phase of the airport master plan (documented in *Office Study 1*), the main focus of public involvement efforts and field reconnaissance was to identify issues needing to be explored in the plan. This section summarizes major categories of issues identified. These comments are important for focusing the master planning effort. Some issues identified, however, extend beyond the purview of the DOT&PF. Others may or may not be supported by further analysis to be conducted as part of the airport master plan process. To the extent that they are within the State purview, the alternatives will attempt to resolve the issues.

#### 2.1.1 General Mixed-Use Issues and Public Comments

The mixing of aircraft with widely varying performance capabilities is a safety issue. Better sequencing, communication, and safety practices are needed.

- Safety between ultra light and general aviation (GA) traffic is a top issue.
- More education and/or enforcement of existing airport operating procedures are needed.

- More information needs to be spread to GA pilots about ultra light vehicle and helicopter patterns.
- Two true parallel runways are needed.
- The two runways are too close together.
- Not enough real estate is available to accommodate the varied activities and traffic density.
- There is a need to buy additional land from Eklutna Inc. to separate ultra light and fixed wing operations. This separation would allow for simultaneous traffic patterns and approaches.
- Another option is to buy land in the area of the existing railroad tracks and locate an additional ultra light runway there.
- The existing Runway 19L/1R traffic pattern builds in conflict between ultra lights and GA aircraft.
- A remote communicator outlet (RCO) should be located on the field so that pilots can more readily talk to Anchorage Center.
- Guidance signs should be installed at all taxiway/runway intersections.
- Threshold markers should be installed on Runway 1R.
- A new taxiway between the northeast and southeast apron should be constructed. This taxiway would be up tight against the access road and would keep pilots from using Runway 19L as a taxiway.
- The taxiways should be widened.

#### 2.1.2 General Aviation Specific Issues and Comments

- The ends of the runways should be wider to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- The runway should be extended.
- It is important to keep the ski strip (Runway 19L/1R) in future plans.
- A larger apron area for ski planes is needed.
- More tie-down space for ski planes should be provided.
- Pilots want electrical outlets at tie-downs.
- A dedicated gravel/ski strip is needed.
- There is a need to keep parking in the southeast ramp (ski/tundra tire) so an aircraft can taxi through the apron on skis.

# 2.1.3 Ultra Light Vehicle Specific Issues and Comments

- A taxiway for ultra light vehicles is needed.
- An ultra light-only runway is needed.
- Turnouts or elephant ears on the ultra light vehicle runway are needed to let ultra lights perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Taxiways should extend to both ends of the ultra light vehicle-landing zone.
- More space for ultra light vehicle operations is needed.
- There is a need to recognize that ultra light vehicle pilots have the right to use publicly funded/owned airports and facilities.

#### 2.1.4 Glider Specific Issues and Comments

- Arrangements should be made to accommodate glider operations. Providing specific glider accommodations will help operations at the field airport more smoothly by reducing the time it takes for the gliders to takeoff and land.
- A glider staging area is needed.
- White runway lights and blue taxiway lights should be mounted flush to the ground to accommodate long wing gliders and snow plow operations.
- It would be difficult to keep lights mounted flush to the ground free of snow and ice.

#### 2.1.5 Environmental Issues

- For the Chugiak-Eagle River area community, it is important that pilots are aware of traffic procedures for noise abatement, etc.
- A pilot noted that noise has only been an issue to the adjacent neighborhoods on a few occasions. Summer, with the long daylight hours, is really the only time when there is a potential for a problem, but such problems occur only occasionally.

#### 2.1.6 Navigation

- The airport should have instrument and GPS approaches.
- A hot-line telephone to the Flight Service Station (FSS) is needed.

# 2.1.7 Airport Condition/Maintenance Issues

- Ownership and responsibility of the entire facility could be turned over to the Municipality of Anchorage.
- Security gates that allow card or code access are needed to reduce incidences of vandalism and theft.
- Airport maintenance is a key issue. A need exists to:
  - o Overlay all asphalt concrete surfaces.
  - o Install a complete new radio-controlled runway lighting system with the wires installed in conduit with junction boxes provided for maintenance access.
  - o Purchase and install a new heated, insulated regulator shed.
  - o Purchase and install a new upgraded beacon.
  - o Purchase and install a new backup generator.
  - O Purchase and install new perimeter fencing with automatic security gate openers.
  - o Replace current snow blower with a new, upgraded unit.
  - o Replace the push blade attachment for the front-end loader with a new, wider plow.
- Public restrooms are needed.
  - o In general.
  - On the southern end.
  - On the northern end.

- o Mid-field.
- o As part of a DOT&PF facility.
- O As part of a private development on airport property.
- A pilot shack/lounge (with a telephone and a restroom) is needed. The FAA has recently allocated funds to develop these facilities.
- Public pay phones are needed. There is a working public pay phone on the north side of the Arctic Sparrow hangar, but this is not a convenient location for GA pilots.
- Telephones should be part of a private development only.
- A public-use hangar is needed to allow pilots to thaw aircraft in winter or to perform light maintenance.
- Public-use space for a café, snack bar, showers, etc, is needed.
- A fence is needed around Eklutna Inc. land to prevent shooting on it.
- An access road around the approach ends of Runway 1L and 1R is needed to minimize runway incursions.
- Access to and the cost of tie-downs and leases are issues.
- More lease lots should be added.
- More land for hangars is needed.
- The southwest corner behind the metal "T" hangars needs development. When those "T" hangars went in (circa 1987) the plan was to fill and level the low area behind them and put in more "T" hangars (from the existing eight to up to 60).
- The existing 100 yards of gravel road from Birchwood Loop to the northeast apron should be paved.
- There should be no "lottery" for parking spaces.
- Lighting should be added for the entire west ramp and especially for the transient parking area.
- Runway 01R is lower than Runway 01L/19L resulting in poor drainage and ponding of water.
- Snow storage and snow removal is an issue at the airport. Private snow removal from the lease lots has also been a problem and is a safety issue. Lessees should take care of their own snow removal. Lessees could haul their snow away or store it on their own lease lot. Another possibility is to allow the lessees to use the southwest, undeveloped area for snow storage.

# 2.1.8 Summary of Safety Issues

- Safety issues arise as a result of mixed operations of two different aircraft types (GA aircraft, ultra light vehicles, gliders, etc.) and the right-of-way rules for each.
  - o The two runways are too close together.
  - o Effective implementation of the Birchwood Airport Operating Rules and Procedures requires the full participation of all the pilots using the airport.
    - GA pilots have been observed to land short, land long, turn crosswind too soon, and at too low of an altitude. When traffic is heavy, these unexpected operations cause delay and frustration.
    - Ultra light vehicles are not allowed to fly over buildings, and therefore they fly a non-standard pattern.

- Radio use at this airport is not mandatory, which complicates the issue of unexpected operations and non-standard patterns.
- o Operating procedures are now enforceable under both state statute and regulation.
- o There is a big difference in airspeed of a GA aircraft and ultra light
- O Under normal operating procedures, ultra light vehicles must give way to all aircraft and gliders.
- o Any aircraft (including ultra light vehicles) has the right of way when an emergency is declared.
- O Ultra light vehicle pilots do not have right-of-way (except in an emergency) and simultaneous operations on the two runways are prohibited. A situation can occur, therefore, where the slower-flying ultra light vehicle can be on final for landing and have a faster GA airplane pass by to land slightly ahead of the ultra light vehicle. When this happens the ultra light vehicle pilot must abort his or her landing attempt and fly a full circle (fly a 360) to create time for the GA plane to taxi off the runway.
- The existing Runway 19L/1R traffic pattern builds in conflict.
- The gravel runway is too short.

#### 2.1.9 Ideas for Alternatives

- Add a floatplane basin. A floatplane facility could be accommodated by shifting the railroad tracks east and locating the floatplane basin in the area of the existing tracks.
- Construct two true parallel runways.
- Separate the two runways by the required 700-foot spacing:
  - o Buy additional land from Eklutna Inc. and relocate one runway.
  - o Buy land in the area of the existing railroad tracks and relocate the ultra light vehicle runway there.
- Create a taxiway and runway only for ultra light vehicles.
- Construct turnouts or elephant ears on the ultra light vehicle runway to let ultra light vehicles perform a 360-degree turn to check for approaching GA aircraft or to get out of the way.
- Extend taxiways to both ends of the ultra light vehicle landing zone.
- Create a glider staging and landing area.
- Modify the infield between the runways to an open grass infield for alternate/emergency landings or staging for gliders. This would also require moving the existing windsock to the opposite side and mounting white runway lights and blue taxiway lights flush to the ground to accommodate long-wing gliders. This type of system is used successfully in Canada, but it may be problematic during snow removal.
- Install guidance signs at all taxiway/runway intersections.
- Install threshold markers on Runway 1R.
- Construct a new taxiway between the northeast and southeast apron, adjacent to the access road, to keep pilots from using Runway 19L as a taxiway.

- Create taxiway access with a hold point midway on Runway 19L/1R.
- Widen taxiways.
- Widen run-up areas to allow airplanes to turn 360 degrees to check for other aircraft in the pattern.
- Extend the primary runway.
- Create a larger ski area.
- Provide more tie-down space for ski planes.
- Construct a dedicated gravel/ski strip.

#### 2.1.10 Other Comments

- Campbell Airstrip could be opened to relieve pressure at Birchwood.
- It is important for the Birchwood Airport to be a self-supporting facility.
- Use should be expanded for economic development.
- It could be useful to study the mixed-use issues in Soldotna (a contact is Doug Anderson) and in Fairbanks at Bradley Field, two airports with ultra light vehicle activity.
- Is there a need for the airport to be relocated within the 20-year planning horizon?
- Given that this is a 20-year planning process, it stands to reason that by the end of this planning period, every available area of land at the Birchwood Airport will be developed.
- The airport contributes to the state economy—many businesses are located at the airport.
- Providing a safe operating condition at the airport is the most important issue.

# 3.0 Demand-Capacity Analysis

The capacity and delay analysis provides a method for evaluating the capability of an existing airfield configuration to accommodate current and forecast levels of air traffic without resulting in unacceptable delay to airport users. By identifying the restrictive component(s) of an airfield's layout and configuration, capacity and efficiency improvements can be recommended to accommodate current and forecast levels of air traffic.

Annual capacity and delay where calculated in accordance with the methodology recommended in FAA advisory circular (AC) 150/5060-5, *Airport Capacity and Delay*.

#### 3.1 Methodology

Current conditions, described below, were reviewed and compared to the findings reported in the 1990 airport master plan. Specific items requiring revision such as Annual Service Volume and Annual Delay were updated to reflect the updated air traffic forecast at Birchwood Airport presented in Chapter Three of the *Birchwood Airport Master Plan Conditions and Needs Assessment Report* (March 2002).

Presented below is a discussion of each element reviewed in the evaluation.

Airfield Configuration. Airfield configuration relates to the number, location, and orientation of the aprons, taxiways, and runways. The airfield configuration at Birchwood consists of two runways orientated approximately north to south; three exit taxiways; and three aprons. A parallel taxiway is available on the west side of Runway 01L/19R; Runway 01R/19L also functions as a parallel taxiway to the east.

**Meteorological Conditions.** Meteorological conditions have remained unchanged since the 1990 airport master plan.

**Runway Usage.** Runway use is expressed as the direction and kind of operations performed on a runway. Simultaneous operations at Birchwood Airport are not allowed even though there are two runways. Based on the survey responses and actual counts of aircraft operations mentioned in previous chapters, the following table presents the use of each runway as a percentage of operations.

Table 3-1	
Percentage of Annual Operations per R	unway
Birchwood Airport	_

Runway 01L	Runway 19R	Runway 01R	Runway 19L
13%	44%	10%	33%

Source: HDR Alaska, Inc.

Note: Percentages are based on pilot survey responses and actual counts of aircraft operations mentioned in previous chapters.

**Aircraft Mix.** The aircraft category mix refers to the percentage of total operations by their specific aircraft approach category (AAC). As presented in Chapter Two, the AAC refers to the aircraft's approach speed. The percentage of operations by the airport reference code<sup>1</sup> (ARC) for the 20-year planning period is identified in Table 3-2.

Table 3-2
Percentage of Annual Operations by Approach Categories
Birchwood Airport

Category A	Category B	Category C	Category D
90%	10%	0%	0%
e.g Cessna 170	e.g. Saab Metroliner	e.g. Boeing 737	e.g. C-130

Source: HDR Alaska, Inc.

**Touch and Go Operations.** Touch and go operations involve an aircraft making a landing and an immediate takeoff without coming to a full or complete stop or exiting the runway. Touch and go operations are estimated to comprise a considerable portion (40%) of total annual operations at Birchwood Airport due to the flight school activity at Birchwood and Merrill Field Airports.

**Exit Taxiways.** Birchwood Airport has three exit taxiways. The criteria used to determine the hourly runway capacity only considers exit taxiways "within appropriate exit range and which are separated by at least 750 feet. Only two of the exit taxiways at Birchwood Airport meet the preceding criteria, therefore the resulting "Exit Factor" used in calculating the hourly runway capacity is "2."

#### 3.2 Annual Service Volume

The annual service volume (ASV) is a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, and weather conditions that would be encountered over a year's time. It is important to note that calculation of the ASV is most useful in determining the annual delay. As operations approach capacity, delay increases and the annual service volume decreases. The ASV has been updated since the 1990 master plan as a result of the updated forecast presented in Chapter Three.

The ASV is calculated using the following formula:

$$ASV = C \times D \times H$$

The ARC is a coding system used by the FAA to relate airport design criteria to the operational and physical characteristics of the airplanes intended to regularly operate at the airport. Regular operation is defined as at least 250 operations per year. The ARC has two components (approach category and design group) relating to airport design aircraft. The first component, depicted by a letter code (A, B, C, or D), is the aircraft approach category and relates to an aircraft's approach speed. The second component, depicted by a Roman numeral (I, II, III, or IV), is the airplane's design group and relates to wingspan.

where,

C = the weighted hourly capacity;

D = the ratio of annual demand to average daily peak demand during the peak month;

H = the ratio of average daily demand to average peak-hour demand during the peak month

# 3.3 Weighted Hourly Runway Capacity

Hourly capacity is a measure of the maximum number of aircraft operations that can be accommodated by the airport in an hour. Hourly runway capacity estimates are based on the following assumptions:

- Birchwood Airport has a single runway (i.e. Runways 01R/19L and 01L/19R function as 1 runway for capacity purposes because simultaneous operations are not allowed).
- The percent of arrivals is approximately equal to the percent of departures.
- The percent of touch and go operations comprise a significant percentage (40%) of the total annual operations.
- Birchwood Airport has three exit taxiways. As stated previously, only two of the three taxiways meet the criteria used for calculating the weighted hourly runway capacity.

The elements described above indicate no significant change in the hourly runway capacity at Birchwood Airport since the 1990 airport master plan. Based on the above information, the existing weighted hourly capacity is estimated at 120 VFR operations per hour and 0 IFR operations per hour.

Table 3-3 presents the results of the ASV calculations for Birchwood Airport.

Table 3-3				
Annual Service Volume, Birchwood Airport				
Year	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Annual Operations	86,108	87,253	91,831	109,000
Average Day Peak Month Ops.	472	472	501	601
Design Hour Ops	33	33	35	42
Weighted Hourly Capacity = C	120	120	120	120
Ratio (Annual Ops./Avg. Day Peak Month Ops.) = D	182	185	189	181
atio (Avg. Day Peak Month/Avg. Day Peak-hour) = H_	14	14	14	14
Annual Service Volume = $(C*D*H)$	313,120	317,284	314,849	311,429
Source: HDR Alaska, Inc.				

As shown in Table 3-3, the annual service volume for Birchwood is estimated at an average of 314,000 operations. FAA recommends consideration of development improvements relative to insufficient capacity when annual operations reach 60 percent of the AVS. Annual operations forecast in Chapter Three only account for 35 percent of the estimated ASV. Airfield capacity will remain sufficient through the 20-year planning period.

#### 3.4 Annual Delay

Annual delay refers to the total annual hours aircraft are delayed while attempting to perform landing or takeoff operations at an airport. As demand approaches capacity, individual aircraft delay is increased. Successive hourly demands exceeding the hourly capacity result in unacceptable delays.

The average delay per aircraft is estimated to be approximately 18 seconds. It should be noted however, that the formulas utilized to calculate delay do not account for unforeseeable peak activity and longer periods of delay may occur during peak periods. The results of the demand capacity analysis indicate that no additional facilities will be needed to increase capacity or reduce delay during the 20-year planning period.

# 4.0 Airport Facility Standards

This section identifies the geometric dimensions to which airfield, landside, and airspace/air traffic control facilities should be developed to meet existing and future demands at Birchwood Airport.

#### 4.1 Airfield Facility Requirements

Identifying the appropriate design standards for the development of the airfield facilities is accomplished either by considering a family of airplanes having similar performance characteristics or considering a specific aircraft when the maximum gross weight of that aircraft is over 60,000 pounds. In either case, the choice should be based on the most demanding aircraft family or specific aircraft that is forecast to use the runway on a regular basis. FAA AC 150/5325-4A, *Runway Length Requirements for Airport Design*, defines the most demanding aircraft as the aircraft requiring the longest runway length for takeoff and landing operations. Regular use is defined as at least 250 operations per year.

FAA AC 150/5300-13, Airport Design, establishes an ARC to identify specific design criteria appropriate for the types of aircraft expected to be accommodated at a particular airport. The airport reference code for airports classified as a Local Airport by the Alaska Aviation System Plan (AASP) is B-I; however, the 1990 Birchwood Airport Layout and Access Plan lists the airport reference code as B-II for Runway 01L/19R and A-I for Runway 01R/19L. B-II aircraft have approach speeds between 91 and 121 knots and wingspans between 49 and 79 feet. A-I aircraft have approach speeds less than 91 knots and wingspans less than 49 feet.

Federal and State standards recommend 2,000 feet of runway length for A-I aircraft and 3,600 feet of runway length for B-II aircraft with less than ten seats. The FAA AC 150/5325-4A runway length recommends 800 feet for ultra light vehicles (for approach speeds between 30 and 50 knots).

The Birchwood Airport is currently used by small single and twin-engine aircraft, such as the Cessna 170-320, Piper Aztec, Piper Navajo, and Beech 18. These aircraft fit into approach categories A through B and design groups I through II. The airport is also used frequently by ultra light vehicles, gliders, and aircraft equipped with tundra tires during the summer and skis during the winter. Ultra light vehicles fall into approach category A and design group I. Aircraft equipped with tundra tires or skis at the Birchwood Airport include Piper PA-12s and PA-18s, which are categorized in approach category A and design group I.

The forecast fleet mix for the Birchwood Airport will be comprised of A-I, A-II and B-I aircraft. The combination of the ARCs for these aircraft results in an overall ARC of B-II. Table 4-1 presents the most common aircraft forecast to operate at the Birchwood Airport.

Table 4-1 Forecast Fleet Mix Birchwood Airport

<u>A-I</u>	<u>A-II</u>	<u>B-I</u>
Cessna 172, 180, 210, 310-320	Beech 18	Piper Aztec
	Twin Otter	Piper Navajo
Piper PA-12, PA-18		
Cessna Caravan, Stationair		
Ultra light vehicles (e.g. Antares)		

Note: The combination of ARC A-I, A-II, and B-I aircraft results in an overall ARC of B-II. Source: HDR Alaska, Inc. July 2002.

#### 4.1.1 Runway 01L/19R

Wheeled aircraft (excluding ultra light vehicles and aircraft using tundra tires or skis) operate on Runway 01L/19R (4,010 feet long by 100 feet wide) and are expected to continue to do so in the future. Of the aircraft forecast to regularly operate at the Birchwood Airport, the Piper Navajo requires the most runway length (2,700 feet) and at least 60 feet of runway width.

Based on the anticipated fleet mix, the ARC applicable to Runway 01L/19R is B-II.

#### 4.1.2 Runway 01R/19L

Runway 01R/19L (2,200 feet long by 50 feet wide) currently serves as the sole runway for ultra light vehicles and aircraft equipped with tundra tires or skis. Of the aircraft forecast to regularly operate on Runway 01R/19L, the Cessna 180 (ARC A-I) is the most demanding aircraft and requires 1,310 feet of runway length. The minimum runway width for the ARC A-I is 60 feet.

Based on the anticipated fleet mix, the ARC applicable to Runway 01R/19L is A-I.

#### 4.1.3 Runway Length

Based on the aircraft performance specifications for the design aircraft Runway 01L/19R has sufficient length (4,010 feet) to accommodate B-II aircraft and should be maintained at its full length. Runway 01R/19L has sufficient length to accommodate ultra light vehicles, ski planes, and tundra tire equipped aircraft in the A-I class and should be maintained at 2,200 feet.

#### 4.1.4 Runway Width

FAA recommends a minimum runway width for an ARC of B-II to be 75 feet. For an ARC of A-I, the recommended width is 60 feet. Runway 01L/19R is currently 100 feet wide. Runway 01R/19L is 50 feet wide. Based on the forecast air traffic and the anticipated fleet mix, Runway 01L/19R will not require additional runway width to accommodate future demand or the critical aircraft. Runway 01R/19L should be widened an additional 10 feet to meet the standard of 60 feet.

#### 4.1.5 Runway Shoulder Width

As defined in FAA AC 150/5300-13:

"Runway shoulders should provide resistance to blast erosion and accommodate the passage of maintenance and emergency equipment and the occasional passage of an airplane veering from the runway."

FAA AC 150/5300-13 also recommends the surface of runway shoulders to be a natural surface (such as turf) that reduces the possibility of soil erosion and ingestion of foreign objects by aircraft engines or being thrown by propellers. Soils without turf or with potential for a debris-hazard should be stabilized or paved. For an ARC of A-I or B-II the recommended runway shoulder width is 10 feet wide. Elevation separation between the runway surface and the runway shoulders should be no more than three inches.

Runway shoulders for both runways are currently 10 feet and meet the recommended width and surface standards. No additional runway shoulder width will be required during the planning period. Where runway 01L/19R is widened, 10 feet of shoulder width should be maintained.

#### 4.1.6 Runway Safety Area

The runway safety area (RSA) enhances the safety of airplanes that undershoot, overrun, or veer off the runway. It also provides greater accessibility for firefighting and rescue equipment during such incidents. The RSA width is measured from the runway centerline. The RSA length begins at each runway end. As prescribed in FAA AC 150/5300-13, the RSA shall be:

- 1. Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations;
- 2. Drained by grading or storm sewers to prevent water accumulation;
- 3. Capable, under dry conditions, of supporting snow removal equipment, ARFF equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and
- 4. Free of objects, except for objects that need to be located in the RSA because of their function. Objects higher than 3 inches above grade should be constructed on low-impact-resistant supports of the lowest practical height with the frangible point no higher than 3 inches above grade. Other objects, such as manholes, should be constructed at grade. In no case should their heights exceed 3 inches above grade.

All runways at Birchwood Airport currently have sufficient RSA length and width and meet the above surface standards with the exception of the approach end of Runway 01L. The approach end of Runway 01L is deficient by 100 feet in length. Table 4-2 compares the existing RSA to the recommended standards.

Table 4-2
Runway Safety Area
Birchwood Airport

	<u>Exis</u>	ting
ARC A-I Standard	Runway 01R	Runway 19L
240 ft	240 ft	240 ft
120 ft	120 ft	120 ft
400 D II	Exis	ting
Standard	Runway 01L	Runway 19R
300 ft 150 ft	200 ft <sup>1</sup> 150 ft	300 ft 150 ft
	240 ft 120 ft ARC B-II Standard	ARC A-I Standard         Runway 01R           240 ft 120 ft         240 ft 120 ft           ARC B-II Standard         Runway 01L           300 ft         200 ft <sup>1</sup>

<sup>&</sup>lt;sup>1</sup> The RSA length beyond the approach end of Runway 01L is deficient by 100 ft.

#### 4.1.7 Runway Protection Zone

The runway protection zone (RPZ) function is to enhance the protection of people and property on the ground. As recommended by FAA and where practical, airport owners should own the property under the runway approach and departure areas to at least the limits of the RPZ. The FAA also recommends that, where it is practical, to clear the entire RPZ of all above ground objects. When it is impractical, the RPZ should at least be cleared of all facilities supporting incompatible activities leading to the assembly of people.

The RPZ dimensions applicable to Birchwood Airport are for small aircraft exclusively (aircraft under 12,500 lbs. maximum gross take off weight) operating under visual approaches with visibility minimums not lower than 1 mile. Table 4-3 presents the applicable standards and compares them to the existing RPZ dimensions at Birchwood Airport.

Table 4-3 Runway Protection Zone Birchwood Airport

	<u>Len</u>	<u>gth</u>	<u>Inner '</u>	<u>Width</u>	<u>Outer</u>	<u>Width</u>
Approach End	<u>Standard</u>	Existing	<u>Standard</u>	Existing	Standard	Existing
Runway 01L	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft
Runway 19R	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	225 ft <sup>1</sup>
Runway 01R	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft <sup>2</sup>
Runway 19L	1,000 ft	1,000 ft	250 ft	250 ft	450 ft	450 ft <sup>2</sup>

<sup>1.</sup> The northwest corner of the RPZ for the approach end of Runway 19R is not cleared of trees.

Note: All dimensions are for small aircraft exclusively performing non-precision approaches with visibility minimums not lower than 1-mile.

Aircraft parking and aircraft hangars exist within the RPZ at both ends for Runway 01R/19L.

The northwest corner of the RPZ for the approach end of Runway19R is not cleared of trees. Trees should be cleared from the Runway 19R RPZ. Aircraft parking and aircraft hangars exist within the RPZ at both ends of Runway 01R/19L.

#### 4.1.8 Runway Object Free Area

The Object Free Area (OFA) is centered on the runway centerline and requires the clearing of non-essential above ground objects protruding above the runway safety area edge elevation. It is acceptable to place objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. Objects not essential to either of these functions are not to be placed in the OFA.

The recommended ROFA dimensions for ARC B-II aircraft is 300 feet beyond each runway end and 500 feet of width. The recommended ROFA dimensions for ARC A-I aircraft is 240 feet in length and 250 feet in length. A chain link security fence is located 200 feet south of the approach end of Runway 01L. This fence should be relocated an additional 100 feet to the south in order to clear the object free area for Runway 01L.

Runway 01L/19R currently has 300 feet in length and 500 feet of width of ROFA. Runway 01R/19L currently has 240 feet in length and 500 feet width of ROFA. The existing ROFA dimensions currently meet the recommended standard. No additional ROFA length or width will be required during the planning period.

# 4.1.9 Separation Standards

FAA AC 150/5300-13 recommends standard separations between runways, taxiways, aircraft parking areas, buildings, and helicopter operating areas for the safe operation of active aircraft and parked aircraft while on the airfield, and for the safety of landside terminal buildings.

Runway Centerline to Parallel Runway Centerline. For simultaneous landings and takeoffs using VFR, the minimum separation between centerlines of parallel runways is 700 feet. Birchwood Airport has two runways (01L/19R and 01R/19R). There is insufficient separation (approximately 210 feet) between the runway centerlines to allow simultaneous operations. Simultaneous operations are not allowed at Birchwood Airport.

An additional 490 feet of separation between the centerlines of Runways 01L/19R and 01R/19L would be required to accommodate simultaneous operations.

Of concern at Birchwood is the mix of aircraft. While simultaneous operations are not allowed, the mix of aircraft includes ultra light vehicles, which are slower and often operated without radios, and GA aircraft that have much greater cruise and approach speeds. Despite not allowing for simultaneous operations, the potential exists for ultra light vehicles to be overtaken while operating on 01R/19L by GA aircraft on 01L/19R. In effect creating the possibility for a simultaneous operation to occur. Without a control tower or full radio communications amongst all aircraft, FAA will not endorse such a situation. If the two runways met the minimum separation standard, the safety of the

situation would be much improved, because there would be sufficient space to safely accommodate simultaneous operations.

Runway Centerline to Taxiway Centerline. The distance that applies in this category is the distance between the runway centerline and the taxiway centerline on the aprons. This distance is needed to satisfy the requirement that no part of the aircraft is within the RSA or penetrates the Obstacle Free Zone. The separation applicable to Runway 01L/19R is 240 feet and 150 feet for Runway 01R/19L.

The existing separation between the centerline of Runway 01L/19R and Taxiway A is 200 feet. An additional 40 feet of separation will be required to meet the recommended separation. The existing separation between Runway 01R/19L and the taxi lanes on the Northeast and Southeast apron also appears to be deficient. Neither the apron nor the runway is stripped in this area and so it is impossible to determine the exact centerline of the taxi lane and runway from aerial photography. There appears to be a separation of approximately 90 feet. An additional 60 feet of separation (for a total of 150 feet) will be required to satisfy the recommended criteria.

**Aircraft Parking Area.** This separation standard allows for clearance between active and parked aircraft. The recommended separation distance between parked aircraft is 250 feet from a runway centerline and 240 feet from a taxiway centerline.

The separation distance on the east side of Runway 01L/19R and the aircraft parking area is 350 feet. The separation on the west side is 400 feet. The separation distance between the centerline of Runway 01R/19L and the aircraft parking area is 140 feet on the east side and 1,150 feet on the west side.

The existing separation between the centerline of Runway 01L/19R and the aircraft parking area meets the recommended standards. The existing separation between Runway 01R/19L and the east aircraft parking areas is deficient by 110 feet. No additional separation will be required for Runway 01R/19L. An additional 140 feet of separation should be developed between Runway 01R/19L and the east side aircraft parking area.

**Building Restriction Line.** The Building Restriction Line (BRL) allows for safe separation between aircraft and immovable objects such as buildings, as well as providing for control over the line of sight for air traffic controllers and visibility for pilots on the airfield. FAA AC 150/5300-13 recommends a building restriction line that encompasses the runway protection zones (RPZs), the runway object free area (ROFA), the runway visibility zone, critical navigation aid areas, and airport traffic control, giving the tower a clear line of sight.

The existing BRL at Birchwood Airport ranges between 300 to 600 feet and provides adequate separation. There are no structures within the existing BRL. The existing BRL does not need to be modified.

Helicopter Pad. According to FAA AC 150/5390-2A, the area(s) designated for helicopter landings and takeoffs may be located anywhere on the airport as long as it provides ready access to the user's destination, meets the minimum separation distances between the runway centerline and the final approach and takeoff area (FATO) and unobstructed approach surfaces, and the location minimizes helicopter rotor wash to parked airplanes. The FAA recommends a minimum 300-foot separation between the runway centerline and the FATO at Birchwood Airport.

A helicopter practice landing area is located within Runway 1R/19L about 375 feet from the threshold of Runway 19L. Helicopters are to land within Runway 1R/19L. Two marked FATO are located on lots 19 and 20, block 100 approximately 750 feet, and 550 feet, respectively from Runways 01L/19R and 1R/19L.

The separation between the runways and the existing helipads//FATOs meets the minimum FAA standard. No additional separation will be necessary through the planning period.

#### 4.1.10 Taxiways

Ten taxiways provide access to Birchwood's two runways; all are 50 feet wide and can support an aircraft with a maximum gross weight of 12,500 pounds. Two taxiways run parallel to Runway 01L/19R and eight short taxiways connect the parallel taxiways to the runway.

Table 4-4 presents the applicable standards for taxiways serving Runway 01L/19R (ARC B-II) and Runway 01R/19L (ARC A-I).

Table 4-4 Taxiway Dimensional Standards Birchwood Airport		
	Runway 01L/19R (ARC B-II)	Runway 01R/19L (ARC A-I)
Taxiway Width	35 ft	25 ft
Taxiway Shoulder Width	10 ft	10 ft
Taxiway Safety Area Width	79 ft	49 ft
Taxiway Object Free Area Width	131 ft	89 ft
Taxilane Object Free Area Width	115 ft	79 ft

Existing taxiways at the Birchwood Airport meet all applicable standards and will be sufficient through the planning period. One additional exit taxiway near the approach end of Runway 01L would reduce taxi time on the runway and increase the overall capacity of the airport in preparation for future development.

#### 4.1.11 Aircraft Parking Positions

The Birchwood Airport provides three paved locations to accommodate aircraft parking and tie-downs. The southeast apron is associated with Runway 01R/19L and is intended for operations by aircraft equipped with tundra tires in the summer and skis in the winter. The northeast apron has the largest number of public tie-downs. The DOT&PF handles

tie-down leasing and maintenance at the southeast and northeast aprons; both aprons are open to the public under a use permit. The west apron is comprised of 16 individual lease lots and a transient aircraft parking area (with space for approximately 10 aircraft) that together form the total apron. Each lease lot is typically associated with a building or hangar and provides space to park and store aircraft. At a commercial airport, the number of aircraft parking positions needed depends on the number of peak-hour operations, size of aircraft, and number of peak-hour enplaned passengers. Birchwood is a general aviation airport and therefore the number of aircraft parking positions needed directly corresponds with the forecast of based aircraft. There are currently 430 tiedowns at the Birchwood Airport. The air traffic forecast indicates a need to accommodate an additional 125 tie-down spaces by the end of the planning period.

Single and Multi-Engine Small Aircraft. The air traffic forecast indicates a need for an additional 60 spaces for single and multi-engine aircraft by the end of the 20-year planning period.

**Ultra Light Vehicles.** The air traffic forecast indicates a need for an additional 62 spaces for ultra light vehicles and sport aircraft by the end of the 20-year planning period.

**Helicopters.** FAA AC 150/5390-2A recommends a minimum parking area for helicopters that is equal to 1.5 times the overall length. The minimum spacing requirements recommend a safety area equal to one-third the rotor diameter.

Helicopters must land within Runway 01R/19L or on one of the two FATOs. The air traffic forecast indicates three helicopters could be based at Birchwood Airport for at least some time during the planning period. As at many airports, helicopter pilots operating at Birchwood Airport are likely to park on the apron space abutting their hangar building.

Based on the air traffic forecast and the current apron utilization trends for helicopter parking, no additional operating areas for helicopters will be required during the planning period at Birchwood Airport.

Other (Gliders, Experimental Aircraft, etc.) The air traffic forecast indicates a need for an additional 3 spaces for gliders and other experimental aircraft by the end of the 20-year planning period.

#### 4.1.12 Airfield Pavement

The Birchwood Airport was originally paved in 1978. The southeast apron was paved in 1987. Since then, none of the paved surfaces have been repaved. A review of aerial photography and a site visit indicate that all paved runways and taxiways exhibit longitudinal and lateral cracking. The 2001 pavement conditions report, which is based on a survey performed in 1998, notes that there is medium and high severity cracking in some of the asphalt areas and that corrective maintenance or a pavement overlay will be required by 2006. Based on the recommendations in the 1998 Pavement Condition Report, the age of the pavement, and severity of cracking, all paved surfaces at

Birchwood Airport with exception of the southeast apron should be re-surfaced during the next five years. The pavement on the southeast apron should be resurfaced toward the end of the planning period.

#### 4.2 Airspace and Air Traffic Facility Requirements

Airspace and air traffic facility requirements were evaluated based on the forecast demand and capacity analysis assumptions, and the identified need through the 20-year planning horizon.

#### 4.2.1 Airspace

Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 feet above the ground. The recommended pattern altitude is at 1,000 feet above sea level; the airport is 96 feet above sea level, so therefore, the pattern altitude is 904 feet above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

The mix of aircraft currently using and forecast to use the Birchwood Airport have widely varying performance capabilities. This disparity in aircraft performance in an uncontrolled airspace has at times resulted in a safety issue. General aviation aircraft initiating an approach or departure to or from Runway 01L/19R will occasionally overtake slower ultra light vehicles on approach or departure to or from Runway 01R/19L. Ultra light vehicles are required to abort their approach/departure if a faster aircraft overtakes them. This scenario sometimes results in simultaneous landings or take-off operations, which are not allowed at Birchwood Airport. It can also be difficult for pilots initiating an approach to determine if slower aircraft on one of the runways are taxiing or taking off. This problem is compounded when pilots do not or cannot monitor or announce their position and intentions over the Common Traffic Advisory Frequency (CTAF).

FAA further evaluated these airspace conflicts in September 2000. FAA undertook a traffic count survey of the Birchwood Airport to determine the need for an air traffic control tower. Based upon the traffic counts and the absence of scheduled commercial service, FAA determined that Birchwood Airport does not qualify for the establishment of an air traffic control tower by the FAA.

In order to reduce these conflicts separate facilities for ultra light vehicles should be provided.

As described previously in the *Birchwood Airport Master Plan, Office Study* #1, the airspace located 1.7 miles to the south of the Birchwood Airport and extending to 11,000 feet is restricted airspace for the Fort Richardson Army Base. It is intended to exclude all aircraft not participating in military training exercises from 0500 (5:00 a.m.) to 2400 (12:00 a.m.) Monday through Friday. The location of this restricted area forces aircraft to fly over Eagle River while going to and from Anchorage.

Airport users have requested the development of a GPS approach to the Birchwood Airport. The combination of R-2203B and the Chugach Mountains, 3.5 miles to the east, will affect the design of a possible future instrument approach.

There are two small terrain penetrations to the FAA Part 77 surfaces. A number of trees may also penetrate the approach surfaces. DOT&PF has an avigation and hazard easement for routine removal of trees. There is no agreement between DOT&PF and landowners for the removal of trees beyond the approach end of Runway 01R/19L. It is recommended that identified penetrations should be removed.

#### 4.2.2 Navigational Aid Requirements

Airport and runway electronic navigational aid and visual approach aid requirements are based on FAA recommendations described in U.S. DOT/FAA Handbook 7031.2B, Airway Planning Standard Number One, FAA AC 150/5300-2D, Airport Design Standards Site Requirements for Terminal Navigational Facilities, and FAA Order 5090.3A, Field Formulation of the National Airport System Plan.

Electronic Aids. Electronic navigational aids provide two primary services: (1) precision electronic guidance to a specific runway end; and/or (2) non-precision electronic guidance to a runway or the airport itself. The distinction between precision and non-precision navigational aids is that the former provides electronic descent and alignment (course) guidance; the latter provides only alignment and position location information. Approach aids provide a visual reference to the airport and runway.

The installation of on-airport terminal air navigation facilities is generally predicated by FAA criteria established in U.S. DOT/FAA Handbook 7031.2B. The standards contained in this document use the existing or projected number of annual instrument approaches to determine an airport's qualification for or discontinuance of various airport terminal navigational aids.

Runway 01L/19R has non-precision instrument and visual approaches. Runway 01R/19L only has visual approaches. The existing electronic navigational aids available for non-precision approaches are a VOR and NDB. Visual Approach Slope Indicators (VASI) assist pilots with visual approaches to Runway 19R. As activity at Birchwood Airport increases during the planning period the VASI should be upgraded with Precisions Approach Path Indicators (PAPI).

Visual Aids. The installation of airport and runway visual aids is considered to be fundamental to airport development. These facilities are intended to provide visual cues to the pilot of an aircraft landing at night or during periods of reduced visibility.

Birchwood Airport is currently equipped with the following airport visual aids:

• Identification Lighting: Pilots can identify the geographical location of the Birchwood Airport at night by a green and white airport beacon. The beacon is located approximately 1,300 feet down Runway 19R and approximately 716 feet to the west between Birchwood Spur Road and the gun range, west of Lot 7A, Block 500.

- Visual Approach Slope Indicator (VASI): Visual approach slope indicators provide visual descent guidance and safe wheel clearance (eye-to-wheel height) over the runway threshold for visual approaches on Runway 19R. The Birchwood Airport has one 4-box VASI that can be remotely activated by pilots. Precision Approach Path Indicators should be placed at both ends of Runway 01L/19R to replace the VASI.
- Medium Intensity Runway Lighting (MIRL): Runway lighting provides positive delineation for the edge of usable runway. Runway 01L/19R is lighted with MIRL for its entire length.
- Taxiway Lighting: The portion of Taxiway Alpha that is not Runway 19L has blue taxiway lights along the west side. Taxiway Bravo has blue taxiway lights along the east side.
- Wind Cone: The windsock between Runway 19R and Taxiway Bravo is illuminated by four lights and has a segmented circle consisting of half-buried oil drums painted orange. From the air the segmented circle is difficult to see due to the faded orange paint and the weak color contrast with surrounding vegetation. Another wind cone for Runway 19L is located approximately 675 feet from the threshold, 75 feet to the east. According to DOT&PF leasing, the wind cone for 19L was placed there by ultra light vehicle operators and has not been approved by the FAA or the DOT&PF.

The existing visual aids are sufficient and will accommodate the forecast air traffic during the planning period. Based on input from airport users guidance signs should be installed at all taxiway/runway intersections and threshold markers should be installed on Runway 01R. Markers delineating the segmented circle should be replaced with markers that are more visible. The VASI should be replaced with PAPIs.

#### 4.3 Landside Facility Requirements

Landside facilities evaluated in this section include hangars, fuel storage, vehicle parking, ground access, maintenance buildings, and Airport Rescue and Fire Fighting (ARFF) facilities. Utility requirements such as water, sewer, electrical, and communications are also identified.

#### 4.3.1 Hangar Space

The FAA does not prescribe a specific methodology for estimating hangar space. Birchwood Airport currently has no public hangar or terminal facilities. Airport users and local residents have indicated a demand for additional lease lots to develop private hangar facilities at Birchwood Airport. Owners of based general aviation aircraft at the airport may also have an interest in the future of storing their aircraft in T-hangars.

The State of Alaska will not build or operate public hangars. Therefore, the future lease lot holder will ultimately determine the type and configuration of the facilities on these lease lots. Based on communication with the DOT leasing department, the existing ratio of based aircraft to tie-downs, and comments received during public meetings 15 new lease lots will be needed in the next five years for the development of private hangars and T-hangars. This estimate will accommodate current existing demand as well as projected demand. A mix of lease lot sizes should be provided. The assumed mix of lease lots in the alternatives is comprised of six ultralight and sport aircraft accessible lease lots, 10 fixed based operator-sized lease lots (150' x 150'), two T-hangar lease lots, and 12 smaller lease lots in the 100 feet by 100 to 150 feet size range.

#### 4.3.2 Fueling Facilities

The FAA does not recommend capacity standards for fueling facilities at airports. FAA AC 150/5360-9 does recommend that aircraft fueling facilities be located in reasonable proximity to the terminal area in order to minimize the distance that tanker trucks must transport fuel.

Gas-N-Go is the only FBO at Birchwood Airport that sells aviation fuel to the general public. The fueling area can be congested and pilots experience delay during peak periods of activity. No inadequacies with the existing fuel services have been identified. Since there is only one public aviation fuel supplier it is, however, likely that additional fuel services will be in demand during the 20-year planning period. The development of at least one additional FBO providing fuel and/or fuel truck should be anticipated. Expanded fuel services should be allowed to develop.

#### 4.3.3 Airport Maintenance Facilities

Maintenance at the Birchwood Airport is provided by the State of Alaska. The DOT&PF maintenance building is located north of the northeast apron. This facility is used to store state maintenance equipment and is shared with the Chugiak Fire Department. A sand storage building is located just south of the maintenance building. The airport staffs maintenance personnel on site only when there is work to be done in Eagle River/Chugiak.

The DOT&PF maintenance personnel plow and maintain the paved surfaces and unpaved safety areas. Airport personnel also perform routine maintenance on the airport property. Maintenance vehicles include one front-end loader with a plow attachment and one grader. Airport maintenance equipment should be replaced as needed and as part of routine maintenance to ensure adequate airport maintenance. Airport maintenance personnel also indicate the need for a snow blower, grader, loader, and a storage building for any new equipment. A snow blower used to be stationed at Birchwood Airport but was turned in due to budgetary cuts. A snow blower is transported from the Anchorage Station to the Birchwood Airport as needed. This method is costly and increases equipment maintenance. A snow blower should be stationed at Birchwood Airport to facilitate snow removal in a timely manner.

#### 4.3.4 Aircraft Rescue and Fire Fighting

The ARFF index is a method used to determine the needed vehicles and equipment to provide rescue and fire fighting services at an airport with Federal Aviation Regulation (FAR) Part 139. FAR Part 139 prescribes rules governing the certification and operation of airports that provide any scheduled or unscheduled passenger operation of an air carrier conducted with an aircraft having a seating capacity of more than 30 passengers. Birchwood Airport does not have scheduled or unscheduled passenger service and therefore is not required to have ARFF equipment or service. Given an emergency situation, the Chugiak Volunteer Fire Department (VFD) can be called for emergency services.

Protocols and techniques for emergency services at the airport should be documented and distributed to the appropriate emergency service organizations (Chugiak VFD). The history of collaboration and cooperation between the operators at the Birchwood Airport and the local emergency services should be maintained to ensure effective future emergency services at the airport.

#### 4.3.5 Vehicle Parking

There is no designated public vehicle parking at the Birchwood Airport. Vehicles are parked on private lease lots or on the apron. The development of additional lease lots and aircraft parking apron will accommodate the projected demand for vehicle parking. Vehicles occasionally drive onto the ski apron during winter and leave ruts in the surface. These ruts impede aircraft movement and create a safety hazard. A small public parking lot should be developed near the ski apron to accommodate pilots wishing to access the ski apron. No additional public vehicle parking will be necessary during the planning period.

#### 4.4 Surface Access Facility Requirements

Birchwood Spur Road enters the airport property at the northeast corner, continues across the north runway protection zone, then turns south along the west side of the airport boundary. The lease lot driveways on the west side of the airport connect directly to Birchwood Spur Road. An access road follows the length of the east airport boundary to the southeast apron and connects to Birchwood Spur Road near the northeast corner. Both of these roads are paved with asphalt. A small gravel access road leaves Birchwood Spur Road, opposite the DOT&PF maintenance facility, to connect with the northeast apron. An unpaved access road runs through the south runway protection zone connecting the east and west lease lots. Airport users indicate that the south end of the west side road is in very poor condition. This section of road should be widened and paved to match the existing paved access road. The intersection between the east side airport access road and the Birchwood Spur road connects at a very poor angle. The intersection should either be modified with an island or re-aligned to intersect at right angles.

#### 4.5 Utilities

FAA does not prescribe standards for utility services at airports. All lease lots have access to telephone, electric power, and natural gas. Some airport users have requested electrical outlets at the tie-downs. A working public telephone is located on the north wall of the Arctic Sparrow building. No public water or sewer service is provided to the airport. The nearest sewer system network is in Eagle River 5 miles to the south. Septic systems, holding tanks, and portable outhouses handle the wastewater requirements. Onsite wells supply all the water requirements. The main water trunk line from Eklutna Lake passes within 1.5 miles of the airport, but no branch line services this area.

Matanuska Electric Association (MEA) supplies electrical power and Matanuska Telephone Association (MTA) supplies telephone service to the airport. Enstar natural gas lines follow both the east and west airport access roads. Freedom Refuse supplies some lessees with dumpsters; other lessees haul the solid waste themselves. The individual lessees take waste oil to the Anchorage Landfill.

Tenants have expressed interest in connecting to the municipal utility water and sewer service. The Northern Communities Wastewater Study: Addendum Number 2 to the 1995 Anchorage Wastewater Master Plan (HDR Alaska, 1998a) discusses capital improvement projects and priorities, and "did not find an immediate need to extend wastewater collection into the northern communities area...the area generally has adequately performing wastewater disposal systems." There is, however, a proposed regional wastewater plant located near the airport. The Northern Communities Water Study Addendum Number 1 to the 1995 Anchorage Water Master Plan (HDR Alaska, 1998b) indicates that a water transmission line is proposed right outside the airport area as well. Utilities should be extended as described in the Chugiak-Eagle River Comprehensive Plan and the Northern Communities Wastewater Study.

FAA has recently allocated funds to develop a pilot lounge with telephone and a restroom at the Birchwood Airport. It is recommended that this building be placed near the transient aircraft parking so that visiting pilots may easily access the facility.

The existing airport lighting system and regulator shed are in need of replacement. The existing system is direct buried and not in very good shape. Replacing electrical components takes considerable effort. The regulator shed was damaged some time ago and leaks moisture and dirt inside.

# 4.6 Airport Security

All airport facilities require security protection. To provide a measure of protection, unauthorized persons must be precluded from having access to navigation aids. Large animals and unauthorized persons should be kept off of active aircraft areas. Birchwood Airport is fenced along portions of its western and eastern perimeter. Several gates provide access to lease lots. Many of these gates are consistently left open and appear to be in a state of disrepair or do not function.

Perimeter fencing and working gates should be installed to preclude inadvertent entry of people or animals onto the airport. The situation whereby unauthorized individuals can easily gain access to the airport, of which, many areas are not lighted poses a security problem. To prevent unauthorized incursions onto the airport, security fencing should be extended to completely encompass the entire airport property. Existing fencing should be raised and barbed outriggers should be installed. All new fencing should be eight feet with barbed outriggers. Existing security gates should be replaced with automatic gates that cannot be left open and can be activated with a keypad or security card. Security lighting should also be added to the aprons.

#### 5.0 Alternatives

This section presents three airport development alternatives for the Birchwood Airport over the next 20 years. The alternatives were developed to remedy identified safety and capacity problems and meet the needs of airport users. There are two primary development needs represented in the range of alternatives presented (1) the need for additional lease lot and aircraft parking and (2) providing a safe operating environment for the diverse mix of general aviation aircraft operating at the airport.

Each of the three alternatives recommends additional lease lots and aircraft tie-down aprons to meet future forecast need. During the first five years, 15 new lease lots will be developed. An additional 15 new lease lots for a total of 30 will be developed by 2021. It is recommended that 125 tie-down spaces be developed by 2021. In an effort to maximize utilization of the existing vacant space and meet the forecast demand, lots are not sized large enough to accommodate on-site utilities. Public utility service will be required. Tenants wishing utility service will be responsible for connection costs.

All alternatives assume that the existing lighting system and regulator shed would be replaced.

To safely accommodate the mixing of slower ultra-light vehicles and the faster general aviation aircraft, each alternative explores providing an ultra light vehicle operating area that includes a parallel runway with the required 700-foot separation from existing runways to allow ultra light vehicle and sport aircraft to operate simultaneous with other GA operations and allow for a safe traffic flow in the respective patterns. Runways 01L/19R and 01R/19L will function as one runway and share the same traffic pattern in each alternative. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

The proposed smaller runway should be designed to light-sport aircraft requirements<sup>2</sup>. Light-sport aircraft will require longer runway lengths than the ultra-light vehicles presently using Birchwood Airport. For now, the small proposed runway will be referred to as the ultra-light runway. FAA AC 150/5325-4A, Runway Length Requirements for Airport Design, recommends 800 feet of runway length for an aircraft with approach speeds less than 50 knots. Light-sport aircraft approach speed is 50.7 knots. (This is based on the accepted practice of using 1.3 times the stalling speed for the approach speed.) The Experimental Aircraft Association's AeroCrafter sourcebook indicates that the majority of aircraft that meet light-sport aircraft criteria will require takeoff and landing distances of 400 feet or less. For reference, Soldotna Airport's ultra-light runway is 1,500' x 50'. For initial planning and assessment the proposed runway length will be

<sup>&</sup>lt;sup>2</sup> Currently there is a Notice of Proposed Rule Making (NPRM) to create a new pilots license called the Sport Pilot license. This license will require less instruction and training time than the Private Pilot license and qualify pilots to fly aircraft of limited weight and performance called light-sport aircraft. Light-sport aircraft have the following criteria: maximum takeoff weight = 1,232lbs, maximum stall speed = 39kts, maximum operating speed = 115kts, the aircraft can have a maximum of 2 seats, the pilot and one passenger.

1,000' x 60'. As more detailed analysis is conducted this runway length and width may vary between 800 feet and 1,200 feet.

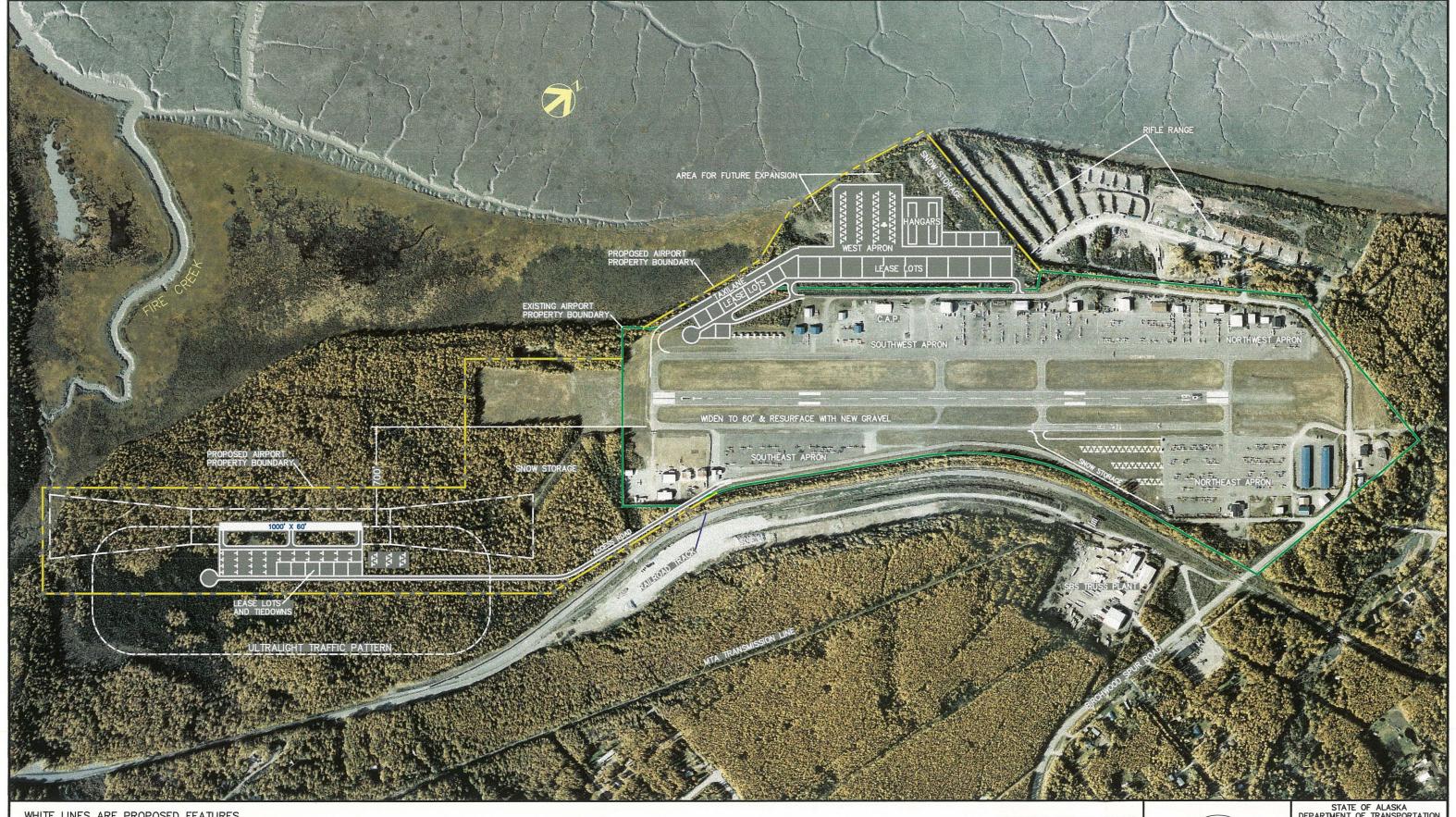
#### 5.1 Alternative 1

Runways. This alternative would locate a new ultra-light runway (1,000 feet long by 60 feet wide) southeast of the existing runways between Fire Creek and the Alaska Railroad tracks (Figure 1). Ultra-light operations and storage will be close to but separate from the existing airport. The proposed runway will be lighted and offset 700 feet east of Runway 01L/19R to allow simultaneous operations for ultra-light vehicles and general aviation aircraft. The runway is positioned so that the ultra-light traffic pattern could be flown west of the railroad tracks. Runways 01L/19R and 01R/19L will function as one runway, sharing the same traffic pattern. Simultaneous operations on 01L/19R and 01R/19L would still be prohibited.

**Taxiways.** No taxiway would be constructed between the new ultra light facility and the existing airport. A new 50-foot by 1,100-foot lighted taxilane (B-II standards) would be constructed to access the expanded west-side apron/GA parking area. The taxilane would connect into the airport at the south end of Runway 01L/19R at Taxiway B. Another B-II standard entry/exit taxiway would be constructed on the east side to reduce taxi time to the runways from the northeast apron expansion area and to increase airport efficiency.

Apron and Lease Lot Development. Aircraft parking and lease lot development would be expanded on a new apron area on the west side of the airport on a vacant parcel south of the gun range. The area, which currently gradually slopes away from the airport, would be configured to accommodate lease lots, GA apron tie-downs, and T-hangar development. This area slopes away from the airport rather gradually and is not anticipated to be an issue during development. Taxiway and apron grades will meet FAA standards. Expansion of the NE apron area southward is also depicted. This expansion would accommodate approximately 64 additional tie-downs. There would also be ultra light apron and lease lot development constructed in association with the ultra light runway development. The assumed mix of lease lots in this alternatives is comprised of: six ultralight and sport aircraft accessible lease lots; 10 fixed based operator-sized lease lots (150' x 150') two t-hangar lease lots, and 12 smaller lease lots in the 100 feet by 100 to 150 feet size range.

Vehicle Parking and Circulation. The southeast apron access road would be extended approximately 4,000 feet to the southeast to provide access for this new ultra light runway; a cul-de-sac turnaround would be provided at the end of the road. This turnaround would be large enough to accommodate commercial trucks. A new loop access road would extend from the existing west side access road to new lease lots. The development of a loop road is shown in the figure because the grade difference may be



WHITE LINES ARE PROPOSED FEATURES YELLOW LINE IS PROPOSED AIRPORT BOUNDARY GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

ALTERNATIVE 1



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FIGURE 1

too great to develop lease lots with access directly onto the adjacent existing road. If, during design, the elevation is found to be satisfactory or the lease area is raised, the existing road may suffice for providing direct access to the lease lots (just as it currently does on the east side of the road). An option with direct access to the lease lots is shown in Alternative 2. Utilities that supply the SE apron would be extended along the proposed access road to the new ultra light runway (see Figure 1).

#### 5.2 Alternative 2

Runways. This alternative would relocate an ultralight lighted runway to the vacant parcel of land south of the gun range and west of the Civil Air Patrol building. There is enough space to place the 1,000-foot long by 60-foot wide runway and associated ~25 tie-downs and six lease lots. The proposed runway is offset 1,165 feet from Runway 01L/19R thus allowing simultaneous operations from on runways. The ultra light operations will take place over the shoreline and Knik Arm within the larger general aviation traffic pattern. Ultra-lights leaving the area would have to cross the general aviation traffic pattern. While there is room to position the runway here, ultra-light operating rules, FAR Part 103, prohibits ultra-light vehicles from flying over an open air assembly of persons which would include the gun range during shooting competitions. This alternative would require relocating the gun range somewhere else or reducing its size. Runways 01L/19R and 01R/19L would function as one runway, sharing the same traffic pattern. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

**Taxiways.** As in Alternative 1, a new 50-foot by 1,100-foot lighted taxilane (B-II standards) would be constructed to access west-side development. The primary difference would be that this taxilane would access the ultralight runway and apron area, allowing direct access by planes between the different operating areas (in Alternative 1 the ultralight operating areas was not tied into the other operating areas with a taxiway). Identical to Alternative 1, Alternative 2 has a new B-II standard entry/exit taxiway on the east side to reduce taxi time to the runways from the northeast apron expansion area.

Apron and Lease Lot Development. General aviation lease lots, and apron tie downs would be developed on the east side of the ultra light runway and the west side would be reserved for ultra light leases and apron development. To meet the remainder of the forecast, additional GA apron development is proposed on the south side of the northeast apron (as in Alternative 1) and south of the southeast apron. The assumed mix of lease lots in the alternatives is the same as in Alternative 1.

Part or all of the land currently occupied by the Izaak Walton League Recreational Facility (gun range) would need to be acquired to prevent stray bullets from striking ultra light vehicles. Snow would be stored at the newly acquired property from the gun range.

Vehicle Parking and Circulation. A new access road 2,000 feet long would connect the west side of the proposed ultra light runway to the existing airport perimeter road. This road will cross through the runway protection zone but remain clear of the runway object free area. The southwest end of the existing perimeter road will be extended 1,200 feet to

give access to the east side lease lots and tie-down area. This alternative shows how the apron and lease lot access would look, if it is feasible to use the existing road alignment to access the proposed west-side development. A cul-de-sac turnaround will accommodate large commercial trucks. The southeast apron access road would be extended to access new lease lots and apron development on the expanded southeast apron (see Figure 2).

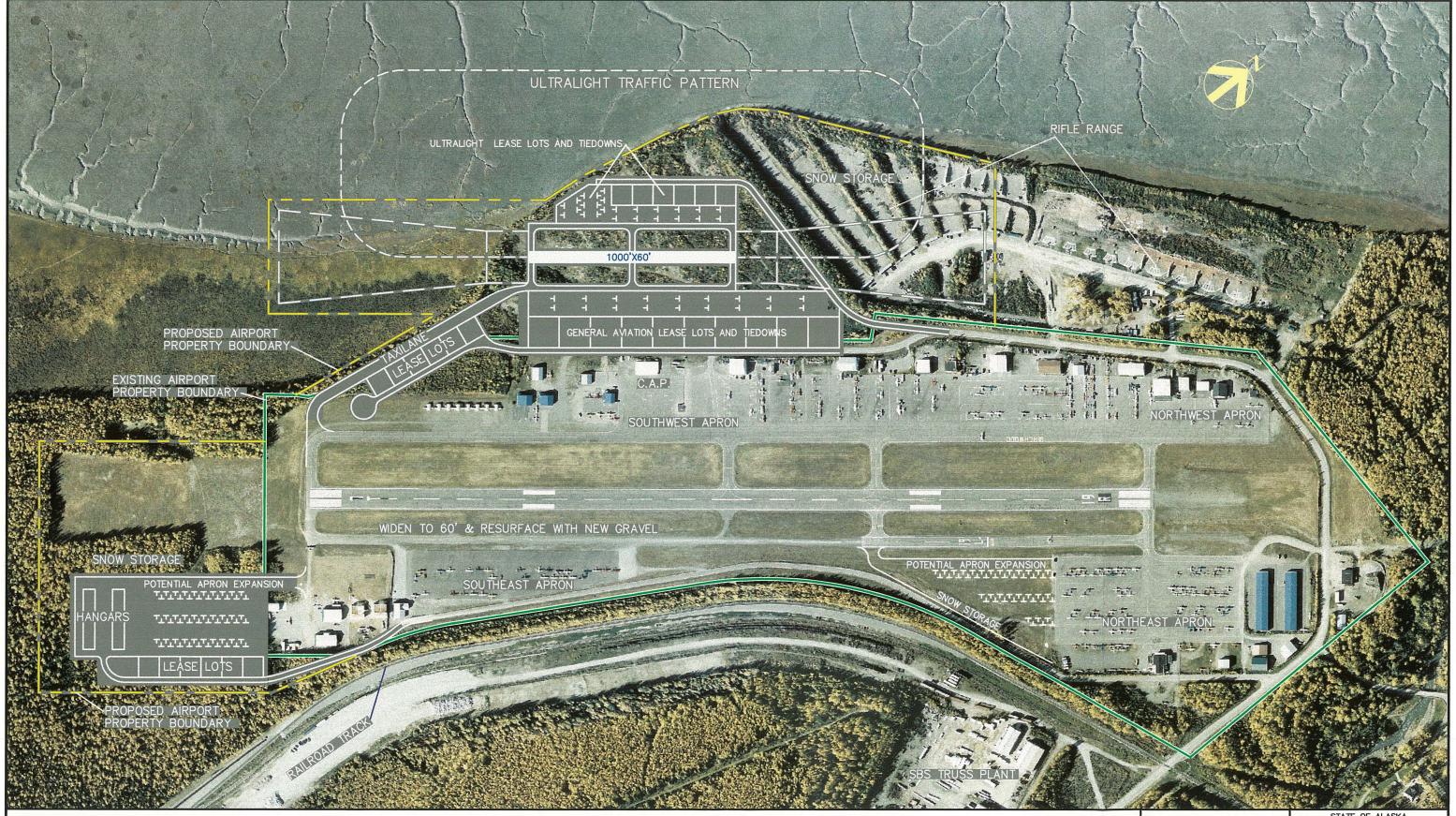
#### 5.3 Alternative 3

Runways. This alternative would develop a lighted ultra light runway near the existing runways by offsetting it 895 feet to the east of Runway 01R/19L. Such a location would require relocating the Alaska Railroad Corporation's (ARRC's) mainline track, the Birchwood rail yard, and changing the layout of the Spenard Building Supply (SBS) truss assembly yard. The track alignment shown in Figure 3, maintains the existing road crossing at Birchwood Spur Road and misses the buildings associated with Spenard Builders Supply. The track relocation meets ARRC track speed and curvature criteria. See Appendix B for details on the railroad track alignments considered.

The ultra light traffic pattern for this alternative would cross the railroad tracks. Flights operating off this runway would have to be temporarily suspended while a train is passing through this area. There is an elevation difference between the airport and the railroad. Therefore, the area associated with the proposed runway may require excavation to lower it to allow an acceptable grade for the taxiway access. Lower the ultralight operating and lease lot area, to, the existing airport elevation, would allow the same access road to access lease lots on both sides of the road without unacceptable driveway grades. Runways 01L/19R and 01R/19L will function as one runway, sharing the same traffic pattern. Simultaneous operations on Runways 01L/19R and 01R/19L will still be prohibited.

Taxiways. As in Alternative 2, this alternative provides lighted taxiway access between the ultralight runway and the other operating areas at the airport. To provide the access between the ultra light facility and the existing airport, a 25-foot wide (A-I standard) taxiway would be developed at the south end of Runway 01R/19L. This taxiway would be developed for ultra light use only. It is not essential that the ultralight and other general aviation operating areas be connected by taxiway, but it does provide some advantages. For instance, lease lot owners anywhere on the airport (that may own and store a mix of planes in their hangers - including ultralights), would be able to taxi to the ultralight operating area. Ultralight leaseholders on the new facility would be able to taxi to access maintenance and other services that may not be available on the ultralight apron.

A new exit/entry taxiway (ARC B-II) would be developed near the approach end of Runway 01L, on both the east and west sides of the runway. These entry/exit taxiways would reduce taxi time and increase airport efficiency for approaches onto Runway 01L accessing the southeast or west aprons. In addition, two new (ARC B-II) taxiways connecting the east-side apron expansion to the runways would be developed to mirror the entry/exit taxiways on the west side of the airport.



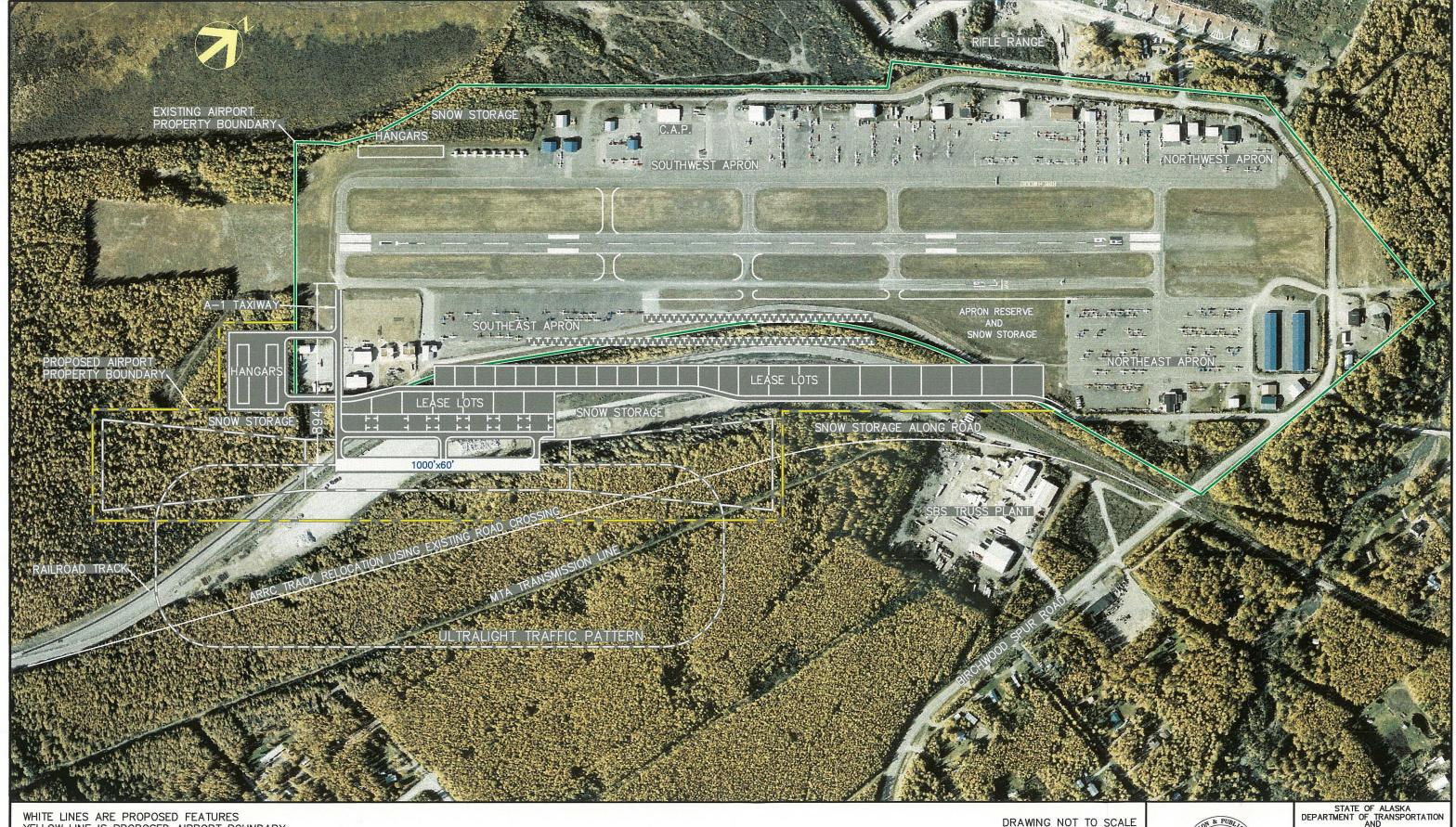
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FIGURE 2



WHITE LINES ARE PROPOSED FEATURES YELLOW LINE IS PROPOSED AIRPORT BOUNDARY GREEN LINE IS EXISTING AIRPORT PROPERTY BOUNDARY

ALTERNATIVE 3



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
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FIGURE 3

Apron and Lease Lot Development. Relocation of the ARRC tracks opens the entire east side of the airport for lease lot and apron development. Lease lots associated with the ultra light runway would be located on the east side of the access road and lease lots and tie-downs for larger general aviation aircraft would be located on the west side of the access road. The assumed mix of lease lots in the alternatives is the same as in Alternative 1. Four additional T-hangar lots would be prepared adjacent to the existing T-hangars at the southwest end of the airport. Snow would be stored at the existing location (Figure 3 apron reserve). Additional snow storage would be located adjacent to the proposed lease lots shown on the east side of the airport (Figure 3).

Vehicle Parking and Circulation. The proposed 3,500-foot long access road, would run parallel to and be offset approximately 500 feet from the ski/tundra tire runway; in essence the proposed access road straightens out the existing access road through the area of relocated rail tracks. It would terminate at the southeast apron at a T-hanger expansion area after crossing the new ultra light access taxiway. The roadway crossing the taxiway is not ideal, but the level of airplane taxi activity at the crossing would be light. An automated gate or signal system could be installed if activity grew sufficiently to warrant such a system.

## 6.0 Alternatives Evaluation

Each of the three alternatives have been analyzed in the following sections with respect to the potential environmental, functional, social, and economic impacts based on the operational and functional criteria established by FAA and DOT and environmental criteria established in FAA Order 5050.4A.

## 6.1 Operational and Functional Evaluation

This first section presents an evaluation of the following operational and functional criteria:

- National Plan of Integrated Airport Systems Eligibility
- Design Standards
- FAR Part 77 Airspace Penetrations
- Wind Coverage
- Air Traffic Patterns
- Operations and Maintenance
- Construction Costs

## 6.2 National Plan of Integrated Airport Systems Eligibility

The National Plan of Integrated Airport Systems (NPIAS) identifies existing airports that are significant to national air transportation and, therefore, eligible to receive grants under the Airport Improvement Program (AIP). The NPIAS is comprised of all commercial service airports, all reliever airports, and selected general aviation airports meeting specific criteria detailed in the NPIAS report to Congress.

To be considered for inclusion into the NPIAS, an airport must have at least ten locally-owned based aircraft, be no closer than 20 miles from the nearest NPAIS airport, and must be located at a site that can be expanded and improved to provide safe and efficient airport facilities. The activity criteria may be relaxed for remote locations or other mitigating circumstances.

Birchwood Airport currently meets the preceding criteria and is included in the NPIAS. The improvements recommended in all of the three alternatives will improve airport facilities and ensure that the Birchwood Airport continues to be listed as a NPIAS airport and receive AIP funding.

## 6.3 Design Standards

Alternatives 1, 2, and 3 would fully comply with FAA and DOT design standards for runways, taxiways, apron and terminal areas. All sub-standard facilities identified in Chapter Four would be improved to comply with FAA and DOT standards. Runway separation would be increased to allow simultaneous aircraft and ultra light operations.

## 6.4 FAR Part 77 Airspace

The Federal Aviation Regulations (FAR) Part 77 establishes the airspace surfaces desired for safe operation of the airport that should be free from obstructions and establishes standards for determining obstructions to air navigation. The regulation applies to existing and proposed manmade objects and objects of natural growth and terrain.

Because the terrain in areas surrounding the airport is relatively level, none of the alternatives would have topographic FAR Part 77 airspace penetrations. To provide safe airspace however, a considerable number of trees would need to be removed in Alternatives 1 and 3. Alternative 2 is relatively free of trees. It is likely that the buildings associated with the gun range would need to be removed; particularly those within the runway protection zone.

## 6.5 Wind Coverage

FAA AC 150/5300-13, Airport Design, states that when a runway orientation provides less than 95 percent wind coverage for any aircraft forecasted to use the airport on a regular basis, a crosswind runway is recommended.

Wind data (speed and direction) for the Birchwood Airport was acquired for a period between July 1996 and December 1998 and used to compute wind coverage percentages for the existing runway alignments. Wind data was analyzed using the FAA 4.2D version *Airport Design, Standard Wind Analysis* microcomputer program.

As shown in Table 2-3 of Chapter Two in the *Birchwood Airport Master Plan, Office Study 1*, Runways 01L/19R and 01R/19L currently exceed 95 percent wind coverage. The new ultra light runway proposed in Alternatives 1, 2, and 3 would be aligned within the optimal range for wind coverage (39 degrees to 48 degrees true north).

#### 6.6 Air Traffic Patterns

Birchwood Airport underlies Class E airspace. Class E airspace is controlled airspace with a floor set to 1,200 ft above the ground. The recommended pattern altitude is at 1,000 ft above sea level; the airport is 96 ft above sea level, so therefore, the pattern altitude is 904 ft above the ground. Thus, all operations at Birchwood Airport take place in uncontrolled, Class G airspace.

Aircraft activity related to the improvements proposed in Alternatives 1, 2, and 3 would continue to be performed in Class G airspace. No changes to the airspace are proposed. The traffic patterns proposed in Alternatives 1, 2, and 3 for ultra light aircraft meet FAA standards for unlicensed operators flying ultra light aircraft. These traffic patterns would not overlie populated areas.

## 6.7 Operations and Maintenance

Additional snowplowing and pavement maintenance would be required for all alternatives. Taxiway and apron lighting maintenance and costs would also increase. The relative additional maintenance burden can roughly be equated with the amount of paved surface and lighting added to the airport under each alternative.

Alternative 1, would add 869,700 square feet of paved surfaces to the existing maintenance efforts at the airport. Alternative 2, would add 792,400 square feet of paved surfaces to the existing maintenance efforts at the airport. Alternative 3, would add 729,100 square feet of paved surfaces to the existing maintenance efforts at the airport.

	and Maintenance sphalt Surface			
	Alternative 1	Alternative 2	Alternative 3	
Runway	60,000 ft <sup>2</sup>	60,000 ft <sup>2</sup>	60,000 ft <sup>2</sup>	
Taxiway	33,100 ft <sup>2</sup>	93,800 ft <sup>2</sup>	57,800 ft <sup>2</sup>	
Road	96,000 ft <sup>2</sup>	76,800 ft <sup>2</sup>	85,200 ft <sup>2</sup>	
Apron	680,600 ft <sup>2</sup>	561,800 ft <sup>2</sup>	526,100 ft <sup>2</sup>	
Total	869,700 ft <sup>2</sup>	792,400 ft <sup>2</sup>	729,100 ft <sup>2</sup>	

## 6.8 Construction Impacts

Construction impacts under Alternative 1 occur completely on the west side of the ARRC tracks. Apron/lease lot development on the west side of the airport would occur adjacent to Cook Inlet, generally away from current airport operations and leaseholders. Water quality impacts from erosion to adjacent tide flats during construction would be minimized by the use of Best Management Practices. Apron and lease lot construction on the extension to the northeast apron may require temporary displacement of adjacent tied down aircraft. Construction of the ultra light vehicle runway to the southeast would be in a vacant industrially zoned area. Water quality impacts to the adjacent wetlands and hydrology would be minimized by the use of Best Management Practices. Construction impacts would be temporary.

In Alternative 2, ultra light vehicle facilities and apron development occur to the west of the airport. As in Alternative 1, little affect to aviation users is anticipated during construction but concerns with erosion and sedimentation on adjacent tide flats would be minimized by the use best management practices. Expansion of the northeast and southeast aprons may require temporary displacement of adjacent tied down aircraft.

Alternative 3 would require relocation of the ARRC track and yard. During construction, temporary train delays and track shut downs would likely be required when tying the new

track alignment into the ends of the existing track. Expansion of the northeast and southeast aprons may require temporary displacement of adjacent tied down aircraft.

## 6.9 Construction Costs

Preliminary cost estimates have been prepared that cover the costs associated with development of the alternatives depicted in Chapter 5.0. Costs include an estimate of the proposed ultralight and sport aircraft taxiway, access roads, and apron development. The estimates include a line item for miscellaneous items such as striping, fencing, signs, gates, and lighting that is assumed to be 25% of the construction cost. For Alternative 3, the costs of relocating the ARRC rail line and sidings are included. A 25% contingency has been added. Engineering costs are assumed to be 10% and construction administration is assumed to be 15%. The estimate assumes that no special subsurface work will be required. Land acquisition costs are estimated separately.

The preliminary construction cost estimates (in 2002 dollars) for the three alternatives are \$4.6 million, \$4.2 million, and \$10.1 million for Alternatives 1, 2, and 3, respectively.

For details on the cost estimates see Appendix A. For details on the rail engineering feasibility and cost estimates, see Appendix B.

#### 6.10 Environmental Evaluation

This section presents an evaluation of the three alternatives for improving the Birchwood Airport. Each alternative is evaluated against potential environmental, functional, social, and economic impacts in the form of an *initial* environmental assessment (IEA) based on criteria established in FAA Order 5050.4A:

- Noise
- Compatible Land Use
- Social and Induced Socioeconomic Impacts
- Air Quality
- Water Ouality
- Hazardous Materials
- Section 4(f)
- Biotic Communities
- Endangered and Threatened Species
- Wetlands
- Coastal Zone Management
- Floodplains
- Coastal Barriers
- Wild and Scenic Rivers
- Farmland
- Energy Supply and Natural Resources
- Light Emissions
- Solid Waste Impacts
- Operations and Maintenance
- Construction Impacts

The IEA is an initial analysis based on professional judgment, with little or no public or agency scoping of issues, to identify the environmental consequences to result from the proposed alternatives. National Environmental Policy Act compliance will be completed during later phases of the master plan. The issues discussed here are intended to help frame the issues discussion during the formal environmental scoping process, reduce development options to those that are reasonable, and help DOT&PF and the public begin to identify a preferred development alternative.

Figures 4, 5, and 6 depict an overview of the three alternatives relative to environmental considerations discussed in Chapter 6.0.

#### **6.11 Noise**

Noise at levels that may be objectionable in terms of health or nuisance effects generally occur as a result of one of the following activities: construction, vehicle traffic, aircraft traffic, and population growth and urbanization. The concern about noise is directly related to its negative impacts upon human and animal health in terms of annoyance, permanent or temporary hearing loss, speech interference, sleep interference, and other related disturbances.

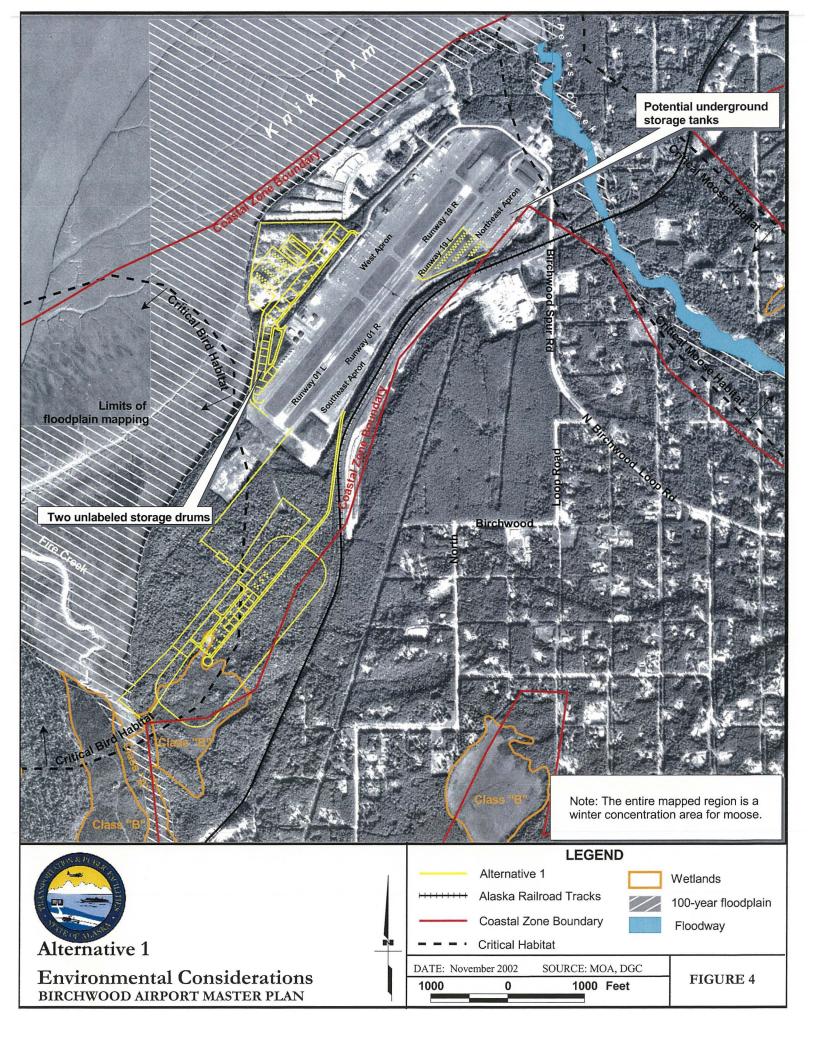
All of the proposed alternatives will require a noise analysis during the environmental assessment per FAA's Order 5050.4A which states,

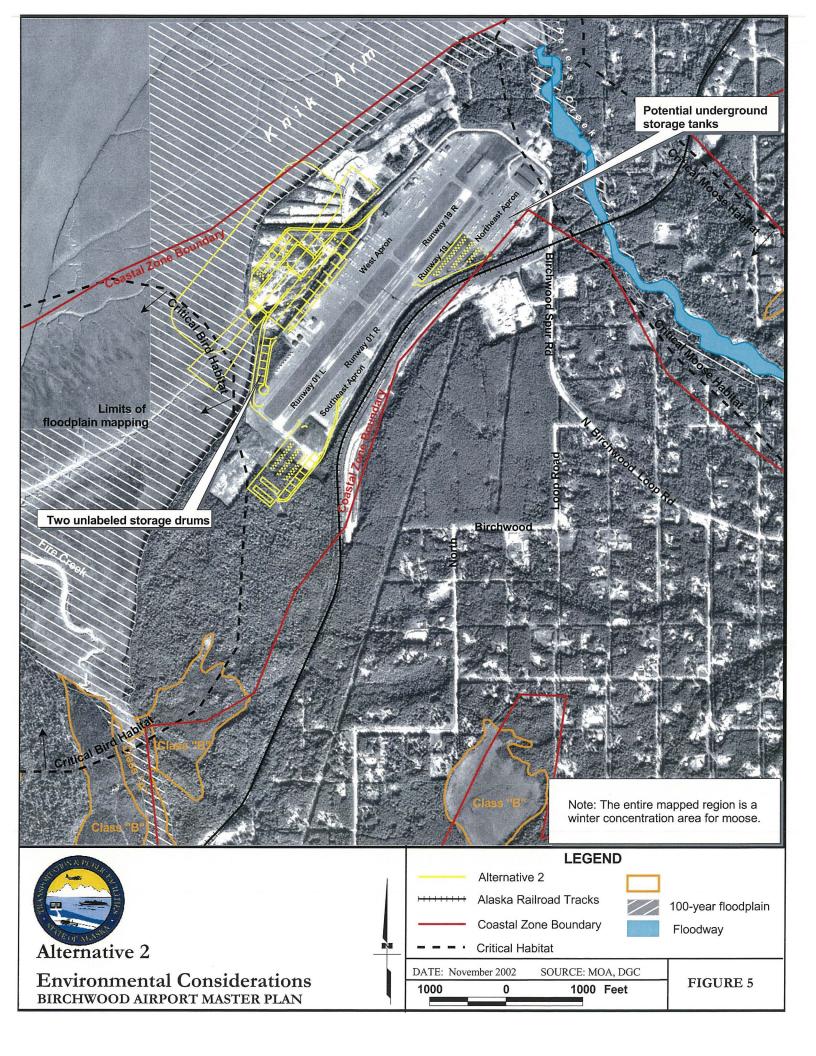
"No noise analysis is needed for proposals involving Design Group I and II airplanes on utility or transport type airport whose forecast operations in the period covered by the environmental assessment do not exceed 90,000 annual adjusted propeller operations or 700 annual adjusted jet operations."

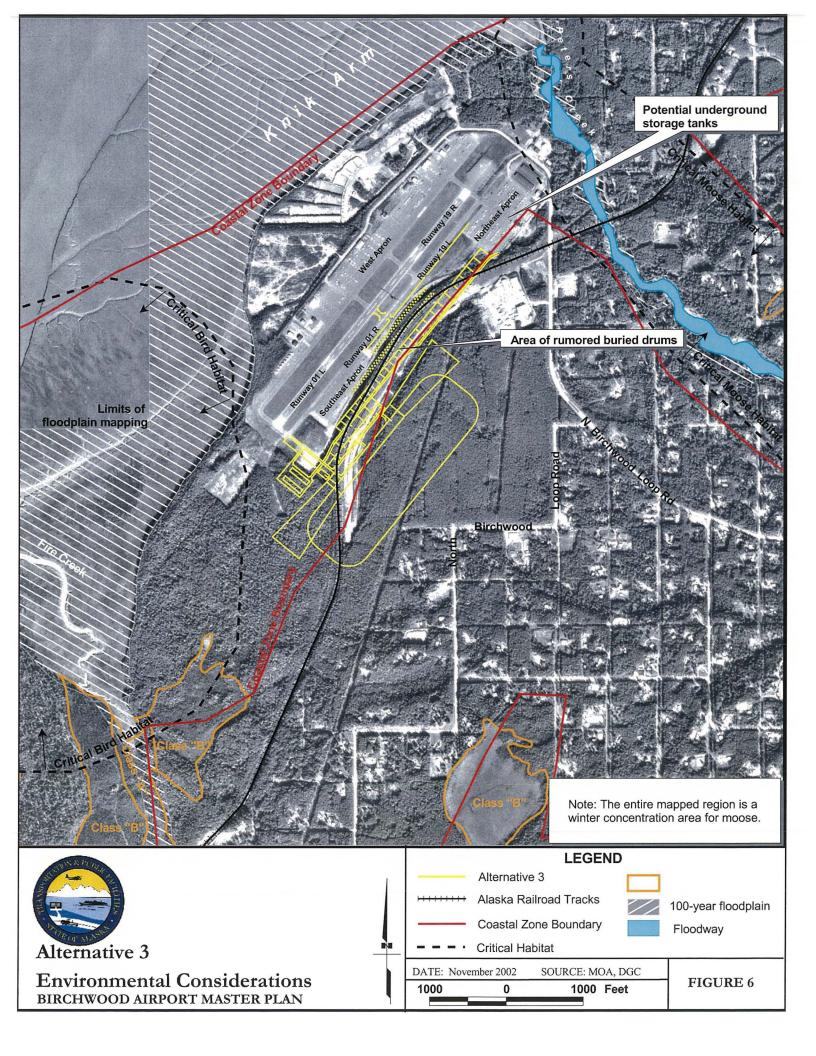
All of the proposed alternatives will accommodate the forecast air traffic demand, which is predicted to be above 90,000 annual propeller operations by the end of the 20-year planning horizon. Because each of the alternatives accommodates the same level of demand, each alternative is likely to produce similar levels of noise. The distinguishing factors amongst the alternatives in regards to noise are the relocation of ultra light vehicle facilities and the potential re-alignment of the railroad closer to or further from existing noise receptors.

The improvements proposed in Alternative 1 will move ultra light vehicle facilities to the south of the approach end of Runway 01R. This moves ultra light vehicle facilities closer to existing residential noise receptors than is currently the case. Of the three alternatives, Alternatives 1 and 3 may produce a more noticeable increase in noise related disturbances from aircraft activity, as the approach patterns in these two alternatives are close to residential development.

The improvements proposed in Alternative 2 will move ultra light vehicle facilities adjacent to the tidal flats on the west side of the airport. In this location, ultra light vehicle facilities would be further away from noise receptors than is currently the case. Because Alternative 2 moves aircraft activities furthest from noise receptors, it would







likely produce the least increase in noise related disturbances. Moreover, Alternative 2 requires some acquisition of property from the gun range, likely reducing or eliminating that noise source.

Improvements proposed in Alternative 3 move ultra light vehicle facilities and railroad tracks closer to residential areas on the east side of the airport. Of the three alternatives, Alternative 3 may produce the greatest noise related disturbance; primarily resulting from the relocated rail operations, but also as a result of the ultralight and sport aircraft operating pattern moving closer to residential property.

## 6.12 Compatible Land Use

The existing airport property is owned by the State of Alaska and is bounded by land owned by the Alaska Railroad Corporation, Eklutna Incorporated, and privately owned parcels comprising the Izaak Walton League Recreational Facility (gun range).

Municipal zoning and platting ordinances do not apply to the Birchwood Airport because it is located on state property. The Municipality of Anchorage, however, does regulate the way in which the land surrounding the airport is developed. Municipal zoning ordinances are important for maintaining compatibility between adjacent land uses and the airport. Future development surrounding the Birchwood Airport would follow existing zoning patterns. The airport property is presently zoned for Light Industrial (I-1). The surrounding land is zoned for Light Industrial (I-1), Heavy Industrial (I-2), Public Lands and Institutions (PLI), and Suburban Residential (R-6) (large lot).

Alternative 1 would relocate the ultralight and sport aircraft vehicle operations to an area that is currently zoned R-6, which allows large lot residential development. There is no residential development on the west side of the railroad tracks. Given the industrial nature of the rail operations on the east side of the area and the airport and industrially zoned land to the north, introducing additional airport operations in this area would likely be compatible. As discussed in other sections, there would be minor noise and light effects to the residential properties east of the tracks. An earthen berm would need to be developed between the proposed west apron and the adjacent gun range in order to provide a sufficient buffer so that bullets would not stray into the airfield.

Alternative 2 relocates the ultralight and sport aircraft runway to an area zoned for light industrial uses. The area within the runway protection zone should not allow the congregation of people, which is likely the case during shooting tournaments. Moreover, the mix of ultralights and sport aircraft flying in a low-level pattern over an active shooting area would create an unsafe situation. As such, the ultralights sport aircraft flying over the gun range would not be a compatible land use and therefore the gun range would need to be relocated.

Alternative 3 relocates an ultralight and sport aircraft runway to heavy industrial property currently in use by the ARRC for a rail line and siding. The ultralight and sport aircraft runway area and relocated rail facilities would remain on industrially zoned land and

would be compatible land uses. As discussed in other sections, there would be minor noise and light effects to the residential properties east of the tracks.

## 6.13 Social and Induced Socioeconomic Impacts

The principal social impacts to be considered are those associated with relocation or other community disruption that maybe caused by the proposal. Induced socioeconomic impacts include shifts in patterns of population movement and growth, public service demands, and changes in business and economic activity to the extent influenced by the airport development.

All three alternatives will accommodate the forecast air traffic demand and will therefore promote increased aviation activity and increase the number of people using the facility, roads to access the facility, and associated services and utilities. Improvements proposed in Alternative 1 may require an operational change or development of a physical barrier (to guard against stray bullets entering the proposed apron area) between the new GA apron and the Izaak Walton Recreational League's parcel. Improvements proposed in Alternative 2 will require the purchase of all or part of the Izaak Walton Recreation League's parcel. Use of that parcel would affect recreation users that use the gun range. Relocation of the facility could affect the accessibility of the facility and, depending on the location of the relocated facility, could cause noise or other impacts to adjacent land uses at the new location. Improvements proposed in Alternative 3 will not disrupt or displace any existing community or recreation facilities. The Anchorage Water and Wastewater Utility has a wastewater treatment plant planned for a location east of the ARRC tracks. The relocation of the tracks could affect that planned facility.

## 6.14 Air Quality

The National Ambient Air Quality Standards (NAAQS) established by the EPA focuses on six pollutants. These pollutants are known as criteria pollutants because a health-based air quality standard has been established for them. The six pollutants are carbon monoxide (CO), airborne particulates, airborne lead, sulfur dioxide (SO<sub>2</sub>), ozone (O<sub>3</sub>), and nitrogen dioxide (NO<sub>2</sub>). Eagle River is currently designated as a non-attainment area for airborne particulate matter (PM<sub>10</sub>).

The Birchwood Airport is outside the PM-10 Zone established by the EPA for the Chugiak-Eagle River area. Birchwood air quality is not monitored and is assumed to be generally good. None of the alternatives are anticipated to substantially impact air quality.

# 6.15 Water Quality

Under Section 303 (d) of the Clean Water Act, each state is responsible for submitting a list of waterbodies whose water quality is limited by point and/or non-point sources of pollution. The Alaska Department of Environmental Conservation maintains the list for Alaska. Neither Fire Creek nor Peter's Creek are on the current list, which was last updated in 1999 (<a href="www.state.ak.us/local/akpages/env.conserv/">www.state.ak.us/local/akpages/env.conserv/</a>). The Alaska Department of Environmental Conservation is currently updating the list of impaired waterbodies but

it is not anticipated that any waterbodies near the project area will be included on the updated list. With proper design, none of the alternatives are anticipated to result in a measurable or noticeable change in the local water quality.

#### 6.16 Hazardous Materials

In 1998 the DOT&PF commissioned an environmental site assessment of the Birchwood Airport (Shannon and Wilson 1998). The purpose of the site assessment was to develop a professional opinion as to the potential presence of petroleum contaminants and/or hazardous substances on or near the airport that had an impact on the soils and groundwater at the site. Based on the historical document review, a visual inspection of the site and surrounding properties, and interviews, the assessment concluded that there is a "moderate to high potential that the subject site has been impacted by petroleum hydrocarbons and/or hazardous substances from on-site activities." The report also concludes, however, that there is a "low potential that petroleum hydrocarbon and hazardous substances from an off-site source have impacted the soil and groundwater" at the airport.

Most of the identified concerns occur on existing developed properties and would have There were a couple of potential hazards no affect on the proposed alternatives. identified, however that could be affected by the proposed alternatives. Under Alternatives 1 and 2, the taxiway leading to the proposed development on the west side of the airport would pass through an area where two unlabeled storage drums were located. On the same side of the airport, a pipe, which appeared to be tank piping and could be connected to an underground storage tank, is located in an area where the proposed roadway extension would be located. Alternative 3 would be located through an area currently used by the railroad. According to the report, in 1998 there were four aboveground propane tanks present on the railroad siding east of the airport. The ARRC property was not listed on any contaminated sites databases and ARRC personnel had no knowledge of any spills on the railroad tracks in the vicinity of the Birchwood Airport (Shannon and Wilson 1998). There were, however, rumored to be buried storage drums between the airport road and ARRC track, although no evidence of these drums was found during the investigation. The report recommends a geophysical survey and test pit excavations be conducted to ascertain the existence or absence of the drums. The Alaska Department of Environmental Conservation (ADEC) removed two underground storage tanks located on the Northeast Apron several years ago.

## 6.17 Section 4(f)

Section 4(f) states that special effort should be made to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. Use of land subject to Section 4(f) management is not permitted unless there is no practical and feasible alternative to using that land; and the project includes all possible planning to minimize harm to the land proposed for use.

The Izaak Walton League Recreational Facility borders the airport's northwestern property boundary. The Izaak Walton League is on private property and, therefore, not subject to Section 4(f). An inventory of Anchorage's historic resources, including those in the

Chugiak-Eagle River area, was undertaken in the mid-1980s. Six structures were included in the inventory, none of which are in proximity to the Birchwood Airport. No Section 4(f) affects are anticipated.

#### 6.18 Biotic Communities

Moose are known to concentrate along the Peters Creek drainage northwest of the airport. There are populations of smaller mammals such as beaver, muskrat, marten, mink, weasel, snowshoe hare, arctic ground squirrel, porcupine, hoary marmot, coyote, red fox, lynx, and squirrel and possibly land otter (MOA 1993). Common lake birds include common loons, mallards, red-necked grebes, goldeneyes, scaup and green-winged teal. Shovelers, pintails, widgeons and Canada geese also nest in the area. The deltas of Fire Creek and Eklutna River are important areas of bird concentrations during migrations (MOA 1993). The Chugiak-Eagle River Comprehensive Plan (MOA 1993) identifies a large area southwest of the airport (the Fire Creek delta) as bird habitat for bald eagle, northern harrier, hawk, owl, and willow ptarmigan. None of the alternatives will require acquisition of publicly owned wildlife or waterfowl refuges of local, state, of national significance. Alternative 3 proposes development within identified bird habitat, among the identified species are bald eagles. The United States Bald and Golden Eagle Protection Act protects bald eagles.

The 2000 Alaska Department of Fish and Game's (ADF&G) catalogue of anadromous fish streams identifies two anadromous fish streams in the project area; Peters Creek and Fire Creek. Peters Creek, located approximately 650 feet north of the Birchwood Spur Road, has been noted to provide habitat for king and pink salmon and rearing habitat for coho salmon. Fire Creek, located 4,500 feet south of the threshold for the approach end of Runway 01L, provides habitat for king salmon and rearing and spawning habitat for coho. None of the alternatives proposes development directly affecting the identified anadromous streams.

The National Marine Fisheries Service 2002 draft essential fish habitat data indicates that the tidal area adjacent to the Birchwood Airport provides habitat for a general distribution of adult to juvenile walleye Pollock, sculpin, and cod. None of the alternatives directly affects essential fish habitat.

## 6.19 Endangered and Threatened Species of Flora and Fauna

A review of available related literature and professional knowledge of the area indicates there are no endangered, threatened or critical species of flora or fauna in the project area. Agency scoping should be performed upon selection of the preferred alternative to validate the occurrence of endangered, threatened, or critical species of flora or fauna in the project area.

None of the alternatives are anticipated to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modifications of habitat of such species that is considered to be critical. Alternative 3 proposes development in bald eagle habitat and would require special coordination with the U.S. Fish and Wildlife Service.

#### 6.20 Wetlands

The Municipality of Anchorage classified its wetlands in the Anchorage Wetlands Management Plan (1996). The designation of wetlands as "A", "B", or "C" wetlands was based on the functions each wetland is thought to perform, and the value of each of those functions within the context of the Anchorage Bowl. "A" wetlands are designated for preservation, and are to be maintained in their natural state to the maximum extent practicable. Minor encroachments for roads, utilities, and trails at these wetlands' fringes will be considered if no other alternatives exist. "B" wetlands are slated for retention of their functions, while also allowing for their economically viable use. Development in these wetlands is to be planned to preserve key functions. "C" wetlands are the least valuable of Anchorage wetlands. Development within them is to be allowed, as necessary, to allow for community expansion.

Although there are no wetlands immediately adjacent to the existing Birchwood Airport, there are mapped wetlands further to the east, west, and southwest of the airport. The largest, mapped wetland in the project vicinity is adjacent to Fire Creek and consists of "A" and "B" wetlands. Wetlands adjacent to creeks often serve important functions, including exporting organic matter and nutrients to the creek, providing fish and wildlife habitat, shading the creek, storing creek overflow during floods, and removing sediment from the creek. Other wetlands near the airport include wetlands adjacent to Peters Creek, and coastal/estuarine wetlands associated with Knik Arm and Fire Creek (located northwest and west of the existing airport). Coastal wetlands, although, not included in the Anchorage Wetlands Management Plan, perform a variety of functions including stabilizing the shoreline and providing habitat for fish, birds, and mammals.

Alternative 1 would require the placement of fill in approximately 0.6 acre of Class "B" palustrine wetlands adjacent to Fire Creek (Figure 4). The west runway protection zone of Alternative 1 would require removing the trees in approximately 0.7 acres of wetlands. A jurisdictional wetland determination would be required for Alternative 1, as the boundary of the Fire Creek wetlands may vary slightly from the boundaries shown in the AWMP. According to the AWMP, an individual Section 404 permit would be required for the placement of fill into the Fire Creek wetlands (Class A) and a setback of 25 feet would be required. It may be possible to shift the airport slightly to the north to reduce the affects on the wetlands.

Of the airport alternatives, Alternative 2 would be situated closest to the Knik Arm and adjacent coastal wetlands. Although the southwest runway protection zone would be located in coastal/estuarine wetlands, no impacts to these wetlands are anticipated. Alternative 2 takes advantage of previously disturbed areas adjacent to the existing airport and no wetland impacts are expected with this alternative.

Alternative 3 would be entirely located on uplands or already disturbed areas. This alternative would require the realignment of the railroad. This realignment would not impact wetlands or Peters Creek.

## 6.21 Coastal Zone Management Program

The Birchwood Airport is within the coastal management boundary of the Anchorage Coastal Management Plan. The area adjacent to Fire Creek is identified in the plan as part of the "preservation environment" as a "tidal creek and/or mudflat," "saltwater marsh," and "preservation freshwater wetlands." The preservation wetlands are classified in the Anchorage Wetland Management Plan as "Class B" wetlands. Class "B," are often termed Conservation Wetlands and indicate wetland that are of moderate to high values. Neither Alternative 2 nor 3 have a direct affect on any of these coastal management program areas. Alternative 1, as depicted, would require fill in a portion of the Class B wetlands. It is depicted in its current location to keep the ultra light vehicle flight path to the west of the ARRC tracks. In any event, a coastal consistency determination would be required for any of the alternatives.

## 6.22 Floodplains

An examination of Municipality of Anchorage geographic information system floodplain mapping indicates that none of the alternatives is within any mapped floodplain (100-year or 500-year). Alternative 1 is, however, located within an area of mapped wetlands that are a connected component of the Fire Creek stream system, although are not identified as within the mapped floodplain. It is possible that these wetlands function as flood storage for Fire Creek, or at a minimum work to slow the flow of water into the creek. Reduction in the potential flood storage capacity of the wetlands or increases in flow to Fire Creek due to reduction of the wetland area and an increase in impermeable surfaces (for lease buildings, access road, apron development, and runway-taxiway development) are likely to be issues that would require additional evaluation during the NEPA process.

#### 6.23 Coastal Barriers

There are no coastal barriers in the project vicinity.

#### 6.24 Wild and Scenic Rivers

There are no wild and scenic rivers in the project vicinity.

## 6.25 Farmland

There is no farmland in the project vicinity.

## 6.26 Energy Supply and Natural Resources

Each of the three alternatives would have approximately the same affects on the energy supplies. Each of the alternatives provides for increased apron and lease lot capacity to meet the demand for future general aviation activity at Birchwood Airport. These facilities would create an increased demand for energy to light the aprons and taxiways and for heat in lessee's buildings. None of the alternatives propose changes in facilities that would have major affects on local energy supplies.

Each of the alternatives creates roadway extensions and taxiways needed to access new apron and runway facilities. As such the alternatives involve the movement of air and

ground vehicles. None of the alternatives, however, are anticipated to substantially increase consumption of fuel by aircraft or ground vehicles. Alternative 1, which spreads development the most by relocating ultra light vehicle activities to the southeast of the airport, likely results in slightly higher energy consumption demands.

No measurable change in natural resource consumption is anticipated.

## 6.27 Light Emissions

Each of the airport alternatives would include additional taxiway and apron lighting. Overhead security lights at aprons and parking areas is also proposed. The Birchwood Airport is located in an industrial area and is already lit. With any of the alternatives, vacant industrially zoned property would buffer the airport from nearby residential development. Introduction of additional lighting associated with the proposed alternatives would not likely create an annoyance among people in the vicinity of the installation. Alternative 1, which introduces ultra light vehicle facilities to the southeast, further removed in distance from existing airport lighting, is in a currently dark area, likely results in slightly greater light emissions effects.

## 6.28 Solid Waste Impacts

New lease lot areas may slightly increase the amount of solid waste generated. Each of the alternatives is designed to meet the forecast for future general aviation needs at the airport and would result in similar levels of solid waste generation. Solid waste disposal is handled at the Anchorage Regional Landfill located approximately 9.5 miles southwest of the Birchwood Airport on the west side of the Glenn Highway at the Hiland Road exit. No substantial affect to the landfill is anticipated.

It is reported that the Izaak Walton League Recreational Facility (gun range) has a permit and operates a refuse disposal site on their property. It is believed that only clean fill is allowed at the site but further investigation is warranted during the environmental assessment. Such a facility would be within 5,000 feet of any of the alternatives (including the no action alternative). The disposal site would, however, be aligned with the ultra light vehicle runway depicted in Alternative 2. Such an alignment would be of concern if the disposal site attracts any birds. There is a possibility that the disposal site would be purchased as part of the right-of-way acquisition for the new runway and runway protection zone.

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# Appendix A Cost Estimate Details

#### Cost Estimate Details and Issues

Existing Businesses. As of October 2001, both the Alaska Railroad Corporation and Eklutna Inc. own the property to the east of the existing tracks. Most of the Eklutna Inc. property is undeveloped. The ARRC property contains a small yard with two main yard tracks and a spur track. Three businesses currently lease sections of the yard from ARRC. A lumberyard leases land from Eklutna Inc. and has access to the spur track. The lumberyard is considering expanding its operation to include a truss manufacturing plant in this area. Another business uses the area to store propane. Both of these businesses are important customers to ARRC.

**Land Ownership.** A portion of the Eklutna Inc. land will be transferred to ARRC as part of another track realignment project. The exact extent of the transfer has yet to be determined.

**Development Potential.** The airport land and the land east of the railroad tracks is zoned I-2, heavy industrial. There are very few I-2 parcels with railroad access in the north part of the Municipality of Anchorage. This land is considered important and premium property by ARRC. Losing (not generating revenue from) this I-2 land is a concern for ARRC.

**Relocation Impacts.** Any track relocation to accommodate airport expansion would likely require the relocation of all the yard tracks and the relocation of all structures currently located on the I-2 parcels. A fiber optic cable located along the railroad alignment in the ballast would have to be moved to the new track location. Any change in the track alignment east of the airport would require relocation of approximately 3,700 feet of Matanuska Electric Association's 33-kilovolt transmission lines.

Cost estimate is for the proposed 1000'x60' runway, taxiway and access road. It also includes the extra apron areas depicted on the specific alternative drawing.

	ı													10%	15%		ı	ľ
Alternative 3	\$1,109,725	\$1,202,083	\$1,956,676		\$100,000	\$500,000		3,700	\$148,000	\$46,160	\$359,189	\$357,862	\$5,779,696	\$577,970	\$866,954	\$7,224,620	\$794,173	\$6,430,447
Alter	Excavation cost =	New track cost =	Siding relocation cost =	Miscellaneous RR signals	& RR equipment relocation =	Relocate Existing Structures =	MEA Transmission	Line Relocation length =	MEA Relocation Cost =	Fiber cable relocation =	Miscellaneous =	Contingency =	Project Sub-Total =	Design engineering/ Admin =	Construction =	sub total =	Price received from gravel sales =	track relocation total =
											25%	25%		10%	15%			
Alternative 2	\$158,503	\$155,506	\$90,030	\$223,515		\$105,000	\$62,500	0	\$614,171	\$755,253	\$541,119	\$676,399	\$3,381,996	\$338,200	\$507,299		\$4,200,000	
Alternative 1	\$130,023	\$127,565	\$73,853	\$172,747		\$140,000	\$62,500	\$1,013,491	\$614,171	0	\$583,588	\$729,484	\$3,647,422	\$364,742	\$547,113		\$4,600,000	
	asphalt cost	CAB cost	Type II-a cost	Embankment cost		clearing cost	Tiedown anchors (125ea)	West Apron	NE apron extension	SE apron expansion	Miscellaneous Items	Contingency =	Project subtotal =	Design engineering/ Admin =	Construction =		Project Total =	

Miscellaneous items = striping, fence, signs, gates, lighting etc.
Estimate assumes no special subsurface work required.

runway, taxiway, access road, apron = \$3,647,045

\$10,100,000

Project Total = runway, taxiway, road, apron consist of: 2" asphalt, 6" CAB, 6" Type II-a, 12" embankment It is assumed that the lessees will clear the land and develop the lease lots.

Estimate does not include the cost of land acquisition.

All the land required by these alternatives is owned by Eklutna Inc., Dept. of the Interior, ARRC.

CAB is Crushed Aggregate Base course

# Appendix B Rail Engineering Evaluation

To

File 07072-204-249

From

Dirk Greeley Paul Witt, PE

Date

December 6, 2001

Subject

Birchwood Airport

Railroad Engineering Evaluation

Task 3.2 j



Memorandum

# **Purpose**

This analysis evaluates the Alaska Railroad Corporation (ARRC) Right-of-Way and rail line adjacent to the Birchwood Airport to identify opportunities and constraints to airport expansion. The feasibility of moving or straightening railroad tracks, bridging, etc through this segment is evaluated. The analysis was conducted as part of the Birchwood Airport Master Plan. The purpose of the Birchwood Airport Master Plan is to recommend actions at the Birchwood Airport to improve safety and capacity; identify facilities required to serve existing and future air traffic demand; and develop a phased implementation plan to meet forecasted aviation needs for the next 20 years.

## Background

The Birchwood Airport is a general aviation (GA) airport located approximately 20 miles north of Anchorage and west of the Glenn Highway along Knik Arm. The airport serves a regional role to the Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA community. Official records estimate the Birchwood Airport to have approximately 56,050 operations per year by private general aviation aircraft based at the airport, transient GA aircraft, flight schools operating at the airport, and ultralights. HDR's masterplan puts the number of operations per year at closer to 80,000. Official numbers indicate that there are 170 aircraft based at the airport. The draft master planning estimates put that number at upwards of 421 aircraft. As a result of the heavy demand, all lease lot space and tie downs are in use and airspace issues have become a primary concern for airport users.

The airport has one paved runway 4,010 feet long and 100 feet wide, with full-length taxiways on each side. This runway, 01L/19R, serves GA aircraft. Runway 01R/19L is 2,200 feet long and 50 feet wide and is intended for use by GA aircraft equipped with tundra tires or skis and by ultralight aircraft. This runway is classified as a gravel runway, but the northern end consists of an approximately 700-foot long paved section. Currently, 200 feet separate the two runways at Birchwood Airport; this distance is 500 feet short of the 700-foot separation needed to allow simultaneous takeoffs and landings. If the separation distance were increased to 700 feet the operational efficiency of the airport would improve and airspace conflicts and safety concerns between users would decrease.

Among the potential solutions to the capacity and airspace issues are expansion to allow for proper separation distances for the two runways, increase apron and leasing space, and improve the operational safety of the airport. Birchwood Airport is situated on a narrow section of land bounded on the west by land owned by Eklutna Inc. and the Birchwood Recreation and Shooting Park. The east side is bounded by the tracks and right-of-way of the Alaska Railroad Corporation. One direction for expansion would be to the east toward the Alaska Railroad

Corporation right of way and Eklutna Inc. property. This memo explores options for relocating the Alaska Railroad tracks to create space for airport expansion.

#### Issues

Existing Businesses. As of October 2001, both the Alaska Railroad Corporation and Eklutna Inc. own the property to the east of the existing tracks. Most of the Eklutna Inc. property is undeveloped. The ARRC property contains a small yard with two main yard tracks and a spur track. Three businesses currently lease sections of the yard from ARRC. A lumberyard leases land from Eklutna Inc. and has access to the spur track. The lumberyard is considering expanding its operation to include a truss manufacturing plant in this area. Another business uses the area to store propane. Both of these businesses are important customers to ARRC.

Land Ownership. A portion of the Eklutna Inc. land will be transferred to ARRC as part of another track realignment project. The exact extent of the transfer has yet to be determined.

**Development Potential.** The airport land and the land east of the railroad tracks is zoned I-2, heavy industrial. There are very few I-2 parcels with railroad access in the north part of the Municipality of Anchorage. This land is considered important and premium property by ARRC. Losing (not generating revenue from) this I-2 land is a concern for ARRC.

Relocation Impacts. Any track relocation to accommodate airport expansion would likely require the relocation of all the yard tracks and the relocation of all structures currently located on the I-2 parcels. A fiber optic cable located along the railroad alignment in the ballast would have to be moved to the new track location. Any change in the track alignment east of the airport would require relocation of approximately 3,700 feet of Matanuska Electric Association's 33 kilovolt transmission line.

Airport Access Road. If an option is chosen that realigns the track at the Birchwood Spur Road crossing, it is desirable that the road be realigned to reduce the skewed angle it makes at the railroad tracks. This would increase the safety of the crossing for all users. For safety reasons, roads should cross perpendicular to railroads. As of October 2001 the amount of traffic on Birchwood Spur Road does not warrant a grade separated crossing.

ARRC Track Straightening Project. During the construction season of 2002, ARRC will make minor track realignments adjacent to the airport to allow train speeds of 60 mph. ARRC will also install railroad signals at the siding switches in this area. Eighty-foot rail lengths will be used to reduce the noise and vibration local residents experience. Any track relocation to accommodate airport expansion would require relocation of these improvements.

Elevation Differences. There is an elevation difference between the airport and the railroad tracks and I2 parcels. If the airport expands to the east at its existing elevation a considerable amount terrain would need to be removed. The material to be removed is primarily gravel. Selling this gravel could offset some of the costs of the track realignment. Birchwood Airport elevation is 96 feet above sea level. The railroad track elevation at the south end of the airport is approximately 109 feet above sea level, or 13 feet above the airport. The track elevation at the Birchwood Spur Road crossing is approximately 86 feet above sea level, or 10 feet below the airport. Some of the gravel from the high side will be needed to fill in the low side.

## **Options**

Four possible track realignments were explored. The options were laid out to maintain a design speed through the area of 60mph. To maintain such a design speed, 2 degree curves with 210 foot spirals were used to layout the option locations.

## Option 1

This option explored an alignment that maximizes the area for airport expansion and removes as many track curves as possible. It was laid out allowing for a new bridge across Peter's Creek as a variable. Option 1 extends from ARRC milepost 134.7 to 137.3 and would eliminate ARRC curves 135, 135A, 136 and 136A. It would create a new curve 134C. In doing so, a 36 degree skew is created with Birchwood Spur Road; the road would require realignment to create a crossing with less skew. In achieving this it would also require acquiring the most right of way, a new road crossing, and a new bridge over Peters Creek. A large number or residential lots would need to be acquired.

## Option 2:

This alignment is intended to maximize the area for airport expansion and reduce the number of residential lots required for the realignment as compared to Option 1. Option 2 extends from ARRC milepost 135 to 136.6 and would eliminates ARRC curves 135A, 136 and reverses curve 135. It was laid out allowing for a new bridge across Peter's Creek as a variable. This Option would require a new railroad bridge at a new location and a new road crossing. Birchwood Spur Road would be realigned to reduce the skew.

# Option 3:

This alignment was laid out to create as much airport expansion property as possible, while leaving the existing Peters Creek Railroad Bridge intact; therefore, all track realignment occurs south of Peters Creek Bridge. The crossing of the Birchwood Spur road was allowed to be a variable. Option 3 extends from ARRC milepost 135 to 136.4 and would eliminate ARRC curve 135A. The location of the road crossing is changed slightly. This alignment should allow the relocated Birchwood Rail Yard and yard tracks to remain close to their existing size.

# Option 4:

This alignment was laid out to create as much expansion property as possible while leaving the existing Peters Creek Railroad Bridge and crossing of the Birchwood Spur road as is; therefore, all track realignment occurs south of Birchwood Spur Road. Option 4 extends from ARRC milepost 135 to 136.3 and would eliminate ARRC curve 135A. This Option causes the least change in size to the I-2 parcels and the rail yard.

## Results

The following table contains comparisons of the four Options.

**Comparison of Track Relocation Options** 

	Existing* Conditions	Option 1	Option 2	Option 3	Option 4
Track Length Realigned (ft)	0	11,570	8,310	6,510	5,770
Resulting Grade (%)	0.33	0.31	0.39	0.41	0.40
New RR Bridge	0	1	1	0	0
New Road Crossing	0	1	1	1	0
Area Made Available for	0	131	130	77	48
Airport Expansion (acre)					
Number of RR Curves Removed from	0	3	2	1	1
the segment (milepost 134.7 to 137.3)					
Resulting Travel Distance through the	12,488	11,568	11,683	11,923	12,084
segment (milepost 134.7 to 137.3)					
Resulting Travel Speed (mph)	60	60	60	60	60
(milepost 134.7 to 137.3)					
ARRC Travel Time through the	142	131	133	135	137
segment (milepost 134.7 to 137.3)					
(sec)					
Total Cost	\$0	\$12,700,000	\$10,700,000	\$7,500,000	\$6,400,000

<sup>\*</sup> The existing condition is based on the track alignment after the track straightening work to be completed during the 2002 construction season.

Generally, the grades that would result under any of the options are slightly steeper than the existing track grades because some curves were removed and the length of track shortened. The maximum grade increase was 0.08% on Option 3.

	Option 1	Option 2	Option 3	Option 4
Unclassified excavation (yd³) Excavation cost =	859,896 \$2,579,688	804,120 \$2,412,361	532,833 \$1,598,500	369,908 \$1,109,725
New track length (ft) New track cost =	11,570 \$2,410,417	8,310 \$1,731,250	6,510 \$1,356,250	5,770 \$1,202,083
Total siding length (ft) Siding relocation cost =	13,775 \$1,956,676	13,775 \$1,956,676	13,775 \$1,956,676	13,775 \$1,956,676
Miscellaneous RR signals & RR equipment relocation =	\$100,000	\$100,000	\$100,000	\$100,000
New at-grade road crossing with signal =	\$250,000	\$250,000	\$250,000	\$0
Double Track Railroad bridge =	\$500,000	\$500,000	\$0	\$0
Relocate Existing Structures =	\$500,000	\$500,000	\$500,000	\$500,000
MEA Transmission Line Relocation length =	3,700	3,700	3,700	3,700
MEA Relocation Cost =	\$148,000	\$148,000	\$148,000	\$148,000
Fiber cable relocation =	\$92,560	\$66,480	\$52,080	\$46,160
Construction =	\$8,541,040	\$7,668,468	\$5,965,206	\$5,066,345
Engineering = Miscellaneous =	\$1,281,156 \$1,281,156	\$1,150,270 \$1,150,270	\$894,781 \$894,781	\$759,952 \$759,952
Sub-Total =	\$11,103,353	\$9,969,008	\$7,754,768	\$6,586,248
Contingency =	\$1,110,335	\$996,901	\$775,477	\$658,625
Property Acquisition =	\$1,888,800	\$803,800	\$0	\$0
Total =	\$14,100,000	\$11,800,000	\$8,500,000	\$7,200,000
Amount of fill needed (yd³) Excess gravel to sell (yd³)	398,934 460,962	439,542 364,579	213,112 319,722	105,184 264,724
Price received from gravel sales =	\$1,382,887	\$1,093,736	\$959,165	\$794,173
Project Total = (minus gravel sales)	\$12,700,000	\$10,700,000	\$7,500,000	\$6,400,000

Not included in this estimate is the costs associated with procuring land owned by Eklutna Inc. The Alaska Railroad Corporation and Eklutna Inc. are in the process of trading some land; the parcels east of Birchwood Airport are involved in this trade. At this time it is not known how much land and what portions of these parcels will be traded.

Unit Pri	ces		
Excavation	\$3	\$/yd <sup>3</sup>	
Track installation	\$1,100,000	\$/mile	
60' RR bridge	\$275,000	each	
Siding relocation labor			
& some replacement materials	\$750,000	\$/mile	
MEA line relocation	\$40	\$/ft	
Fiber cable relocation	8	\$/ft	
Engineering	15%		
Miscellaneous	15%		
Contingency	10%		
Gravel sales	\$3	\$/yd <sup>3</sup>	
	\$1.53	\$/ton	

Birchwood Airport Master Plan Birchwood Area Railroad Track Realignment: Train Travel Time Comparison RR Milepost 134.7 to 137.3 12/6/2001

	Existing Condition	Option 1	Option 2	Option 3	Option 4
Distance between MP 134.7 & 137.3 (ft)	12,488	11,568	11,683	11,923	12,084
Distance shortened by Option (ft)	0	920	805	565	404
Travel time at 60 mph (sec)	142	131	133	135	137
Difference in time from existing length (sec)	0	10.5	9.1	6.4	4.6

Birchwood Airport Master Plan Birchwood Area Railroad Track Realignment: Quantity Estimate RR Milepost 134.7 to 137.3 12/6/2001

The ARRC land adjacent the airport descends from south to north. The south half of this land is higher than the airport reference point and the north half is lower than the airport reference point. Part of the high side volume is used to fill in the low side to bring it up to the airport reference point elevation.

The Airport Reference Point elevation is 95.93 or 96.00' Birchwood Spur Road crosses the tracks at MP 136.30

ARRC	
Milepost	Elevation
135.10	108.89
135.37	102.50
135.72	96.00
136.30	85.75

	Total Area ft <sup>2</sup>	Total Area (acre)	Area High side ft <sup>2</sup>	Area Low side ft <sup>2</sup>	High side Volume yd <sup>3</sup>	Low side Volume yd <sup>3</sup>	Excess Volume yd <sup>3</sup>	Excess Weight (ton)
Option 1	5,693,643	131	3,593,992	2,099,651	859,896	398,934	460,962	903,486
Option 2	5,674,253	130	3,360,875	2,313,378	804,120	439,542	364,579	714,574
Option 3	3,348,652	77	2,227,012	1,121,640	532,833	213,112	319,722	626,654
Option 4	2,099,658	48	1,546,057	553,601	369,908	105,184	264,724	518,860

Average height difference, high side = 6.46 ft Average height difference, low side = 5.13 ft ton/yd3 Gravel weight = 1.96 Gravel excavation & sell cost = 3 \$/ton Gravel = \$/yd3 1.53 \$/ton

Birchwood Airport Master Plan Birchwood Area Railroad Track Realignment: Land Acquisition Estimate RR Milepost 134.7 to 137.3 12/6/2001

Option 1			Option 2	
parcel number	Assessed Value	_	parcel number	Assessed Value
		_		
5103205	\$200,200		5103101	\$0
5103206	\$0		5103102	\$42,200
5103214	\$41,400		5108103	\$32,600
5103215	\$20,000		5108104	\$0
5103216	\$56,700		5108114	\$0
5103220	\$56,800		5108115	\$0
5103222	\$175,200		5108116	\$205,700
5103223	\$154,400		5108117	\$161,600
5103226	\$193,600		5108132	\$57,200
5103230	\$203,000		5109331	\$132,500
5103232	\$126,800		5109333	\$172,000
5103236	\$0	·		
5103237	\$0		Total =	\$803,800
5103240	\$0			
5108101	\$0			
5108102	\$0			
5108115	<b>\$</b> 0			
5108116	\$205,700			
5109331	\$132,500			
5109333	\$172,000			
5116101	\$150,500			
-				

Total = \$1,888,800

